BC Laboratory Services Review

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1. EXECUTIVE SUMMARY

1.1 Purpose

For over a decade, the potential for improving diagnostic laboratory services has been actively debated in BC. During this period, the sector has been characterized by rapid - and exceptional - increases in volume and expenditure, with limited attention to the patient or system objectives. Several reviews, dating back to the Royal Commission on Health Care and Costs in the late 1980s, plus others commissioned by the Ministry of Health in ensuing years, have repeatedly recommended reforming lab services to create a more coherent, patient-centered system.

In June 2002 the Government of British Columbia called on the Ministries of Health Planning and Health Services to:

> *"...develop and implement efficiency mechanisms for the Medical Services Plan, Pharmacare, laboratory services, ambulances and regional services."*

In November 2002 the Ministry of Health Planning announced the government's intent to undertake a comprehensive review of BC's laboratory services with a view to introducing reforms that would lead to a more efficient and sustainable provincial system. The end result would be:

> *"... a more coordinated, collaborative and cost-effective system of laboratories that will translate into better patient care and better use of scarce health dollars."*

Laboratory services reform is strategically linked to three of the central long-term goals for the Ministry of Health Services:

- Providing accessible, high quality health care
- Providing patient-centred, public health care
- Creating a sustainable, affordable health care system.

This paper responds to the Ministry's intent to review BC's lab services. It provides an overview of the status of lab services in BC, identifies issues and concerns, and recommends approaches to resolving them. The findings are based on:

- A review of previous reports and submissions on lab reform in BC, and all relevant literature, including unpublished policy documents from other jurisdictions, plus
- Interviews with Health Authority personnel, stakeholder groups, and key informants internal and external to the province.

The review is framed by the need to:

- Create a coherent patient-centered laboratory system focused on seamless service delivery
- Build on the strengths of both strong public and private sector involvement in the system
- Preserve a strong academic teaching and research base and protect core public health and tertiary care assets
- Preserve and replenish the human and capital assets and investment within the laboratory system needed for its future growth and vitality.
- Control costs to ensure the system is sustainable and accessible to patients when they need it

1.2 Definition of Lab Services

Pathology laboratory services – or lab services - are a subset of diagnostic services.

Diagnostic services include all the medically-based services that assist in monitoring diseases in populations (public health component) or assist a managing physician to make a definitive diagnosis on a patient (personal health care component).

Diagnostic technologies include (a) imaging technologies such as x-rays, Computed Tomography (CT) scans, and Magnetic Resonance Imaging (MRI), and (b) pathology services such as blood or other body fluid testing and tissue or cellular analysis.

This report is concerned with *pathology laboratory services* only, addressing personal health care needs.

1.3 Situational Analysis

The provincial government has undertaken four separate reviews of BC's laboratory services since 1992.

All reviews have similar key findings, concluding that BC's lab costs (estimated to be over $120 per capita in 2003/04)) are the highest in the country, and confirming BC has the highest lab services utilization rates of any province. One inter-provincial study found BC's per capita expenditures were 50% higher than the national average and increasing at a faster rate than anywhere else in Canada (34% over the five years studied). All reviews also concluded BC's laboratory sector suffers from a fragmentation of management, lacks system planning, has limited controls on expenditures, and is missing an adequate information infrastructure necessary for efficient management.

The reviews confirm there is clear justification and need for comprehensive reforms of this sector that represents more than 4% of total provincial expenditures approximately $473M in 2002/03. If BC's lab system was reformed to bring B.C's expenditures in line with other provinces and the Canadian average, government spending could be reduced by at least $100M to potentially more than $150M annually.

1.4 Problems with the Current System

Reflecting on the status of lab services currently, against the goals desired by government, there appears to be considerable room for improvement. For example,

1.4.1 Lab services are not patient-centered

- While lab services are accessible to patients, they are not coordinated for optimal patient care. Outpatient services (those provided in the community) are managed separately from inpatient services (those provided in the hospital) without effective information linkages. Seamless care is not assured.

1.4.2 Lab services are fragmented

- The services are not organized as a system. Public and private providers run parallel (often competing) outpatient services in the same communities, even though there is only a single payor, government.
- Lack of information system connectivity also makes it difficult to establish efficient or integrated care since physicians, independent providers, and facilities all use differing information systems, sets of data, laboratory equipment, standards, and patient records.

1.4.3 Lab services lack accountability for quality or costs

- Accountability is unclear because funding and administrative authority is split between population and program grants to Health Authorities (HAs) and Medical Services Plan (MSP) payments to public and private providers.
- Also, only technical quality (to ensure test is done right) is formally measured across the system. There is no recognized authority for overall lab services system performance, making it impossible to determine whether patients are getting too many tests, the right tests, or tests at the right time. Lack of test standardization means some patients may be getting too many tests and treatments and others not enough.

1.4.4 Lab services are not sustainable for the long-term

- British Columbians pay more for lab services than anywhere else in the country. There are duplicate facilities with excess capacity providing the same services and no effective means for controlling prices or volumes of services.
- Also, there is no system-wide planning capacity for new technologies or human resources or for ensuring access to and application of new knowledge and research evidence.

1.5 Goals for Labs Services Reform

The goal of lab services reform is:

> To create a patient-centered lab services system that is accountable for high quality affordable and accessible services for British Columbians and which will be sustainable into the future.

This system would have several defining characteristics:

1.5.1 A patient-centred lab system would:

- Treat patients' lab tests as critical knowledge inputs, essential to managing their overall health.
- Ensure reasonable access to services for the public in the community or region where they live.
- Ensure patients received the right tests, at the right time, and
- Ensure that the right results were reported and that the right clinical management decisions were taken based on the information the lab tests provided.

1.5.2 If lab services operated as a system:

- Roles and responsibilities would be clearly defined and understood
- Service delivery would be seamless and integrated within the broader health care system

1.5.3 A fully accountable lab system would:

- Be able to report on: quality – that the rights tests were being done and that they were being done right; affordability – that patients were getting the best lab services possible at the lowest possible cost; sustainability – that the system would be able to meet future needs and how it would do so

1.5.4 A high quality lab system would

- Promote and support excellence
- Promote and support innovation and the creation and acquisition of new knowledge
- Perform only appropriate lab tests
- Reduce inconvenience to the patient
- Produce accurate results
- Communicate results as quickly as needed
- Ensure the right medical decisions were made based on these results
- Protect patient privacy throughout

1.5.5 An affordable lab services system would:

- Deliver high quality lab services at the lowest possible cost

1.5.6 A sustainable lab services system would:

- Anticipate, plan for, and meet future needs for human resources, technology, and policy
- Train the new personnel required for the future and provide continuing education for those already in the field to ensure currency with new knowledge, technologies, and protocols

1.6 Summary of Challenges

1.6.1 Quality and Utilization Issues

- Utilization review and management are key aspects of improving system quality and efficiency. Because lab services are delivered and regulated by multiple providers and administrative bodies in BC there is little information to determine whether patients are getting the right tests, at the right time or whether the results are being used to support appropriate medical management decisions.

- Inability to trace a patient from a community-based outpatient to a hospital-based inpatient setting makes it difficult to determine the degree of duplicate testing in BC.

- The existence of multiple providers, using multiple tools and technologies, leads to concerns about standardization of tests. Lack of test standardization has serious implications.

- Changes in population demographics and the need for more effective chronic disease management have led to increased demands for certain diagnostic tests.

This volume is driven, not by laboratory providers but by ordering physicians responding to their patients' needs.

- Nonetheless, lab utilization rates in BC are higher than anywhere else in the country and growing at a faster rate. At an average of 7% average annual growth, utilization is increasing at a rate over six times faster than population growth.

1.6.2 Expenditures and Costs Issues

- A recent inter-provincial study estimated:
  - total lab expenditures in BC at $115 per capita, compared with a Canadian average of $77 per capita and $90 per capita in Ontario, the next highest spending province
  - in 2001/02, BC taxpayers paid $100M to $150M more for lab services than elsewhere in the country, and
  - BC's lab expenditures per capita have increased at a faster rate than anywhere else in Canada – 34% over five years, compared with Saskatchewan with the next highest rate of 15% over five years.

- Ministry data show growth in outpatient expenditures for outpatient lab services - more than 44% between 1997/98 and 2001/02 - exceeds:
  - growth in inflation (5%),
  - growth in the MSP Available Amount (AA) budget (25%),
  - growth in the Ministry of Health's budget (37%),
  - growth in the budget of British Columbia government (23%) for the same period.

- Projected Medical Services Plan expenditures for lab services in 2002/03 are $279M - a 9.5% increase over the previous year.

- BC now spends almost half a billion dollars on lab services – an estimated $473M in 2002/03 and a projected $499M for 2003/04.

1.6.3 Human Resources Issues

- Shortages of qualified medical, scientific and technical staff are a serious concern across the country. Recent health personnel gap analyses conducted by the Ministry of Health project a shortfall of over 237 technologists and 88 lab assistants by 2004. Approximately 35% of pathologists in Canada are in the pre-retirement age group (50-59) and more than 1/3 of pathologists in BC's teaching hospitals are 55 years of age or older.

- Retention of all graduating residents over the next five years would meet only half of the projected need for additional and replacement pathologists in existing teaching hospitals.

- BC compensates public Medical Laboratory Technologists at rates from 9% to 12% higher than the 2001/02 Canadian average. These competitive salaries have helped BC to avert the serious professional staff shortages experienced in other jurisdictions.

- BC's salaried, public sector pathologists are among the best paid in Canada.

- There is considerable variation in compensation for pathologists in BC due to the ability of some to supplement salaries with fee-for-service billings. Total incomes of these pathologists are estimated at more than 2-3 times those on salaries or fixed contracts.

1.6.4 Academic Activities Issues

- Demands on clinical instructors and faculty members are increasing as UBC expands its undergraduate medical school enrollment and technologist training programs expand.

- Academic institutions are reliant on professionals employed by Health Authorities to assist in fulfilling their teaching mandates.

- Health Authorities are concerned that under-resourcing of teaching and research functions jeopardizes their capacity to fulfill their academic responsibilities.

- An external review of the UBC Department of Pathology and Laboratory Medicine found lack of protected academic time for teaching and research a major barrier to the recruitment and retention of junior faculty members.

- With competing pressure for service in most delivery sites, the public lab system has very limited ability to make the investments in adaptation and production research required to maintain currency and meet future needs.

1.6.5 Information Systems Issues

- There are 27 or more different lab information systems or versions of systems in use in BC by physicians and HAs with little or no capacity to share information between them.

- There is little information to determine whether patients are getting the right tests at the right time, or whether results are applied to making the right medical decisions.

- The lack of an integrated and standardized information system means patients' tests are often repeated unnecessarily, test result information has to be re-inputted manually at different sites, and a comprehensive picture of a patient's lab history is not available.

1.6.6 Public Health and Tertiary Lab Services

- The creation and maintenance of a critical mass of expertise and technology, linked to a strong academic and research base, is essential to the BC Centre for Disease Control's continued ability to protect the population from such public health threats as the West Nile Virus and Severe Acute Respiratory Syndrome (SARS).

- Specialized tertiary level laboratories, (e.g.- genetic testing, complex serology and virology, and neuropathology), offer services on a provincial basis that are a vital part of the laboratory system and are not amenable to population-based funding formulae which do not adequately address the high fixed costs of providing these specialized programs.

1.6.7 Role of the Private Sector

- Private sector providers have made considerable reinvestments in new and improved technology, achieved significant efficiencies, and done much to increase access. These amenities provide valuable client services.

- Private sector testing is heavily concentrated on a limited set of high-volume and low-cost tests. The major private sector providers are not active in sparsely-populated parts of the province where test volumes are not sufficient to warrant their presence and where service costs are high

- Based on what is known about industrial productivity gains and the high degree of automation in this sector, combined with the fact that professional and specimen acquisition fees are built into the payment for all the tests undertaken—even multiple tests done on a single specimen sample or tests analyzed mechanically—it can be concluded profit margins enjoyed by the private sector are considerable.

1.7 Common Themes & Concerns

Interviews with Health Authorities (HAs) and experts from other jurisdictions highlight common themes and concerns BC should address when reforming the lab system. These include:

1.7.1 The Need for Improved Provincial Coordination

HAs identified several opportunities for improved coordination through elimination of separate funding, regulatory and administrative streams for inpatient and outpatient services, leadership on standardization and quality management, investments in common or linked information systems and programs, and support for sharing best practices. As emphasized by BC's

laboratory pathologist community, improved coordination should not lead to resources being siphoned from patient care to cover increased administration.

1.7.2 The Need for Integrated Management of Lab Services

Patient Care

Artificially distinguishing patients (and payment systems) based on inpatient/outpatient status reduces the prospect of seamless care and limits the possibility of achieving true economies.

Effective laboratory service delivery, such as improved turnaround times for lab tests, can promote efficient patient care across the spectrum. For example, providing timely test results to determine whether emergency department patients require admission, continued inpatient care, or whether inpatients are ready for discharge can contribute to relieving emergency department congestion and inpatient bed utilization.

Representatives of lab professionals, both pathologists and technologists, noted that management decisions can impact on the ability to perform testing in a patient-centred, safe and effective way. Leadership and input from laboratory professionals is essential to ensure system reforms lead to improvements in patient care.

System Funding

HAs use revenues from fee-for-service billings for outpatient services to offset the expense of providing higher cost inpatient lab services.

The lack of controls on the open-ended outpatient component and the interactive effect of this source of funding for lab services on HAs' budgets makes an integrated approach to system funding and management highly desirable.

1.7.3 The Need for a Comprehensive Lab Information System (LIS)

The current lack of connectivity between sites, and the resulting discontinuity of information, present significant limitations to patient care. The need for manual re-entry of key patient information, transmission of hand-written reports, and paper-based file management is time-consuming, error-prone and costly to the system.

A comprehensive, province-wide LIS, with the establishment of core data elements, standards, system connectivity and a common or linked database, is essential to improved patient care and effective utilization management. Such a system must respect patient privacy and confidentiality and, wherever possible and practical, should build on existing information system elements.

1.7.4 The Need for Comprehensive Cost Information

Without a good sense of the complete or comparative costs of lab service delivery across the province or even within their own region, HAs have limited ability to manage costs and achieve efficiencies.

1.7.5 The Need for Improved Test Standardization

BC employs numerous reference systems for laboratory results. A common, internationally recognized standard reference system would be highly desirable. The failure to standardize results can lead to test duplication and limit the potential for decentralization of testing. If lab tests cannot be trusted between sites, tests may have to be repeated.

1.7.6 The Need for Provincially Accepted Standards and Process for Quality Management

While lab technical quality is measured and monitored—to ensure the tests are done right—there is currently no monitoring of whether the right tests are being done, if they are being done at the right time or whether the right decisions are being made based on results. All these aspects of quality need to be managed according to agreed standards and processes. These standards and processes will take time and effort to develop and implement.

1.7.7 The Need to Ensure Access in Sparsely Populated Regions

The costs of serving sparsely populated areas—staffing relatively low volume collection stations and transporting specimens for analysis—are very high. In order to ensure service access in some parts of the province, HAs operate facilities staffed by fewer than 3 people, and some only on a part time basis. The requirement to maintain a critical mass of staff and a reliable specimen transportation system that ensures access in these areas limits the potential for cost savings related to consolidation.

1.7.8 The Need for Human Resource Planning

Human resource shortages of all professional lab personnel have been forecast across the country, however the predicted impact of these shortages varies by region of the province. Outside urban areas, limited career growth opportunities, excessive work demands (significant on-call requirements), and inability to find meaningful work for spouses present considerable impediments to successful recruitment and retention of replacement professional staff.

1.7.9 The Need to Address the Academic Mandate

Experience in other jurisdictions, when reforms focused on achieving savings and failed to acknowledge and protect teaching and research, indicates the

academic mandate suffered through losses of experience and expertise that were difficult to recover. All jurisdictions now recognize the need to dedicate resources to teaching and research without diminishing capacity to provide patient care.

With competing pressures for service delivery and limited budgets, HAs are concerned teaching and research responsibilities will not be adequately addressed. In addition, pathologist compensation structures make demanding public sector academic positions much less appealing than higher income private sector roles.

1.7.10 The Need to Rationalize and Specialize by Level of Care

HAs see considerable potential for province-wide agreement on levels of lab service provision that would designate centres of expertise and specialization and set protocols for service referral. This would clarify what tests need to be referred out to "higher level" facilities and expertise, clarify what test menus and capacities need to be in place at each facility level, reduce redundancies in specialized capacity where they exist, and optimize patient care.

Once agreements have been reached on what level and types of tests should be provided within each HA, or referred out, funding arrangements and/or adjustments should be made accordingly. Inter-regional billing adds unnecessary transaction costs to the system.

1.7.11 The Need to Protect Provincial Public Health and Tertiary Care Mandates

Through the BC Centre for Disease Control (BCCDC), the Provincial Health Services Authority (PHSA) is responsible for fulfilling the province's public health mandate and contributing to national public health efforts. Experience with such public health threats as West Nile Virus and SARS underscore the need to protect the mandate and role of public health and the BCCDC. Similarly, highly specialized tertiary care services need to be supported and adequately resourced on a program basis.

1.7.12 The Need for Policy Forum and Leadership

With the advent of numerous new technologies, notably in the area of genomics and proteomics, there is an increasingly urgent need for policy direction on applications, access, and funding: in which cases should these tests be employed? Who should provide them? How should they be paid for? The expert advice of laboratory service professionals - pathologists, laboratory scientists, and technologists – is a critical input to these policy decisions.

1.8 Addressing Challenges within BC Context

Transformation of BC's lab services into a high quality, accountable, affordable and sustainable patient-centered system cannot be achieved in a piecemeal fashion. Concerted and consistent leadership will be required. Although it is possible to achieve some benefits from isolated steps to reform, optimal gains cannot be achieved without a comprehensive approach.
The artificial distinction between inpatient and outpatient services, reinforced by separate funding and administration, does nothing to serve patients' needs for comprehensive and integrated care. While central coordination and management of Health Authorities' lab services could help to rationalize and improve the network of services provided within and between HAs, it would do nothing to integrate or rationalize the large component of outpatient services from other providers in the community.

A comprehensive lab information system could do much to improve the flow of lab test information and, with the introduction of order entry protocols, help to manage utilization. However, in the absence of structures to support information sharing, joint planning, and system-wide improvements in information systems, quality and utilization, lab service providers have no incentives or requirements to change current practices. HAs are focused on the immediate service needs of their regions. Individual physicians ordering laboratory tests for their patients have little ability to ensure they are optimally using publicly funded laboratory-based resources in support of them. For progress to be made and sustained, collective reinvestments must be made. These cannot be achieved without coordination, expert advice, and leadership to secure agreement on requirements and priorities. The amount of reinvestment resources required for success can not be acquired by *ad hoc* cuts to one or other funding pool – HAs' grants or MSP fees. Reinvestments that serve to create a system of lab services must be drawn from the system as a whole.

2. LAB SERVICES REVIEW OVERVIEW

2.1 Purpose

For over a decade, the potential for improving diagnostic laboratory services has been actively debated in BC. Over this period, the laboratory services sector has been characterized by rapid and exceptional—increases in volume and expenditure, with limited attention to the patient or system objectives being served by this growth. Several reviews, dating back to the Royal Commission on Health Care and Costs (Province of British Columbia 1991) in the late 1980's and others commissioned by the Ministry of Health in ensuing years, have recommended reforming lab services to create a more coherent, patient-centred system. It is felt by many that the time for laboratory service reform has come (Boyd 1999).

In June 2002 the Government of British Columbia called on the Ministries of Health Planning and Health Services to:

> *"...develop and implement efficiency mechanisms for the Medical Services Plan, Pharmacare, laboratory services, ambulances and regional services."*

In November 2002 the Ministry of Health Planning announced the government's intent to undertake a comprehensive review of BC's laboratory services with a view to introducing reforms that would lead to a more efficient and sustainable provincial system. The end result would be:

> *"... a more coordinated, collaborative and cost-effective system of laboratories that will translate into better patient care and better use of scarce health dollars."(Ministry of Health Planning 2002)*

Laboratory services reform is strategically linked to three of the central long-term goals for the Ministry of Health Services:

- Providing accessible, high quality health care
- Patient-centred, public health care
- Sustainable, affordable health

This paper responds to the Ministry's intent to review BC's lab services. The paper provides an overview of the status of lab services in BC, identifies issues and concerns, and outlines key principles to guide resolution. The findings are based on:

- A review of previous reports and submissions on lab reform in BC
- A review of the relevant literature, including unpublished policy documents from other jurisdictions,

- Interviews with Health Authority personnel,
- Interviews with stakeholder groups
- Interviews with key informants.[1]

The review is framed by the need to:

- Create a coherent laboratory system focused on seamless service delivery to patients across all sites of care
- Build on the strengths of both strong public and private sector involvement in the system
- Preserve a strong academic teaching and research base and protect core public health and tertiary care assets
- Preserve the human and capital assets and investment within the laboratory system needed for its future growth and vitality.

Redesign of the provincial laboratory system will be reflected in Ministry of Health Services 2003/04 Service Plan.

2.2 What are Lab Services?

Pathology laboratory services – or lab services - are a subset of diagnostic services. Diagnostic services include all the medically based services that assist in monitoring diseases in populations (public health component) or assist a managing physician to make a definitive diagnosis on a patient (personal health care component). Diagnostic technologies include (a) imaging technologies such as x-rays, Computed Tomography (CT) scans, and Magnetic Resonance Imaging (MRI), and (b) pathology services such as blood or other body fluid testing and tissue or cellular analysis. This report is concerned with pathology laboratory services addressing personal health care – as opposed to public health system – needs.

Personal Health Care:
In attending to an individual's health care needs, a physician may order a diagnostic test to:

- help determine a patient's health status
- inform a treatment decision including
    - providing information in the management of chronic diseases
    - establishing a baseline against which to measure future changes,
    - supporting pre-operative assessments.

The laboratory test is a vital knowledge input to a doctor's medical management of a patient. Information from laboratory tests makes up about 70% of the objective data

[1] All sources are referenced and listed in the bibliography and the key informant list.

reported in a patient's health record (Hoag 2003) and some estimate that 60-70% of diagnoses are based on pathology tests (National Health Service 2002), making them an essential part of effective, timely, and appropriate patient care.

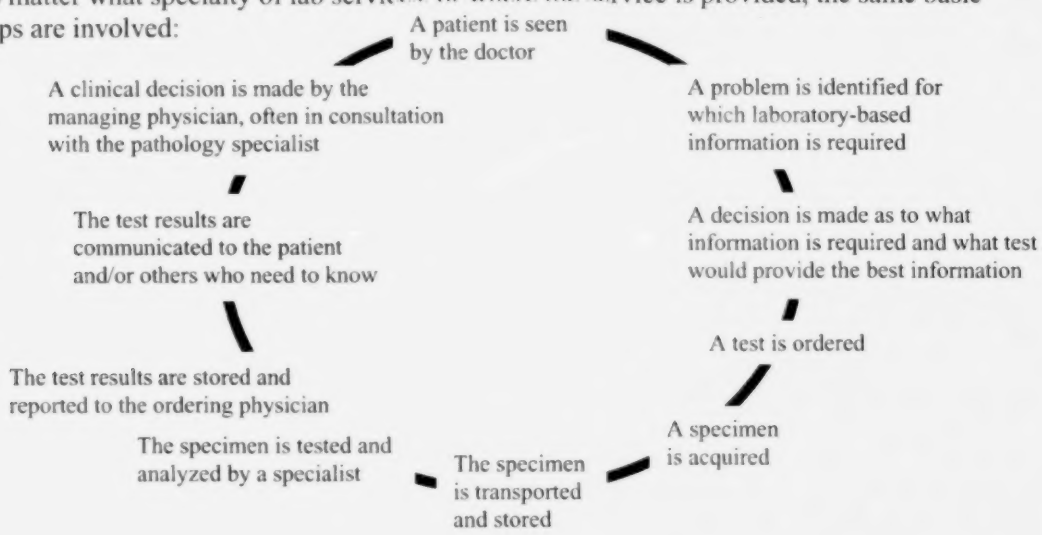
Pathology services may be broken into several divisions: anatomical pathology, hematology, clinical chemistry, microbiology, and transfusion services. Each is involved in conducting different kinds of tests, with significantly different human and technical resource requirements.

Anatomical pathology, involving analysis of human tissue specimens, for example, is very labour intensive and is currently only undertaken in public facilities in BC. Clinical chemistry and most of hematology, by contrast, are highly automated, relying on sophisticated technology to produce results, and are often conducted in community labs that manage very large test volumes.

Laboratory tests may be undertaken on an outpatient or an inpatient basis. In BC, all inpatient tests are undertaken in public hospitals under the administration of one of the province's 6 Health Authorities (HAs). HAs are funded on a population or program grant basis to provide these tests.

Outpatient tests are conducted by either public hospitals or by private community labs. They are funded on a per test basis through the Medical Services Plan (MSP). Private labs account for about 2/3 of the outpatient sector, and hospitals/HAs about 1/3. [2]

No matter what specialty of lab services or where the service is provided, the same basic steps are involved:


A patient is seen by the doctor
A problem is identified for which laboratory-based information is required
A decision is made as to what information is required and what test would provide the best information
A test is ordered
A specimen is acquired
The specimen is transported and stored
The specimen is tested and analyzed by a specialist
The test results are stored and reported to the ordering physician
The test results are communicated to the patient and/or others who need to know
A clinical decision is made by the managing physician, often in consultation with the pathology specialist

An effective laboratory system must be able to ensure quality at all steps in the cycle.

2.3 Goal for Lab Services

[2] A small percentage are small public and private facilities.

The reform of lab services must be focused on a comprehensive goal:

> To create a **patient-centred** lab services **system** that is **accountable** for **high-quality affordable** and accessible services for British Columbians and which will be **sustainable** into the future.

The laboratory system of the future should strive for several defining characteristics:

A **patient-centred** lab system would:

- Treat patients' lab tests as critical knowledge inputs, essential to managing their overall health.
- Ensure reasonable access to lab services for British Columbians in the community or region where they live.
- Ensure patients received the right tests, at the right time, and
- Ensure that the right results were reported and that the right clinical management decisions were taken based on the information the lab tests provided.

If lab services operated as a **system**:

- Roles and responsibilities would be clearly defined and understood
- Service delivery would be seamless and integrated within the broader health care system

A fully **accountable** lab system would be able to report on:

- quality – that the rights tests were being done, and being done right
- affordability – that patients were getting the best lab services possible at the lowest possible cost to taxpayers
- sustainability – that the system be able to meet future needs and how

A **high quality** lab system would:

- Promote and support excellence
- Promote and support innovation and the creation and acquisition of new knowledge
- Perform only appropriate lab tests
- Reduce inconvenience to the patient
- Produce accurate results
- Communicate results as quickly as needed
- Ensure the right medical decisions were made based on these results
- Protect patient privacy throughout

An **affordable** lab services system would:

- Deliver high quality lab services at the lowest possible cost

A **sustainable** lab services system would:

- Anticipate, plan for, and meet future needs for human resources, technology, and policy frameworks
- Train the new personnel required for the future and provide continuing education for those already in the field to ensure currency with new knowledge, technologies, and protocols

2.4 Summary of Status in BC

A review of the status of lab services in BC is essential to identifying areas of concern and opportunities for improvement. The following section provides an overview of lab services utilization and quality management, expenditures and costs, human resources, academic activities, information systems and core assets as well as a summary of the status of lab services reforms, issues and concerns, and opportunities for coordination and collaboration identified by each of the province's six Health Authorities and by the major private sector providers.

Reflecting on the status of lab services in the context of the goals set for BC, there appears to be considerable room for improvement. For example:

Focusing on the patient:

- While lab services are accessible to patients, they are not coordinated for optimal patient care. Outpatient services are managed separately from inpatient services without effective information linkages between them so that seamless care is not assured.

Organizing lab services as a system:

- Lab services are not organized as a system. Public and private providers run parallel and often competing outpatient services in the same communities.

Ensuring accountability:

- Accountability is unclear because funding and administrative authority is split between (a) population and program grants to Health Authorities and (b) MSP payments to public and private providers

Ensuring quality:

- Only technical quality is formally measured across the system. There is no recognized authority for overall lab services system performance so we cannot say whether patients' are getting too many tests, the right tests, or tests at the right time. Lack of standardization means some patients may be getting too many tests and treatments and others not enough.

Ensuring affordability:

- British Columbians pay more for lab services than anywhere else in the country. We have duplicate facilities with excess capacity providing the same services and no effective means for controlling prices or volumes of services.

Ensuring sustainability:

- There is no system-wide planning capacity for new technologies or human resources.

3. QUALITY AND UTILIZATION STATUS REPORT

Approval and license to open a lab or a specimen collection station in BC is granted by the Medical Services Commission, upon the recommendation of the Advisory Committee on Diagnostic Facilities (ACDF). All labs in the province are accredited by the Diagnostic Accreditation Program (DAP), constituted as a formal committee under the auspices of the College of Physicians and Surgeons of BC.

The Diagnostic Accreditation Program of BC (DAP) was established in 1971. It derives its authority and mandate from the *Rules Made Under the Medical Practitioners Act* that requires facilities performing diagnostic laboratory tests to hold a certificate of accreditation as a diagnostic facility.

The DAP is required to establish minimum standards which form the basis for accreditation for each diagnostic facility. The rules state that:

> *The diagnostic facility, its professional and technical personnel, its equipment, space and safety procedures, must at all times meet the standards of the committee as set out from time to time.*

In recognition of significant changes occurring in health care, new approaches to accreditation being introduced throughout the world, and challenges faced by the DAP itself, a review was initiated by DAP in December 2000. The review concluded that the DAP has made a very significant contribution to improving the quality of diagnostic medicine in the province of BC, that the program enjoys an excellent reputation across the country, and that it has been seen as a benchmark for developing similar programs in other provinces. However, the review also identified several issues with conclusions including that:

- Immediate funding was required to support the DAP and to address a backlog in accreditation and inspection, and a review of "outdated" standards and guidelines.
- The DAP should continue to function as an independent body
- The DAP process and requirements are too detailed and bureaucratic
- The DAP's scope should be carefully defined so that the program does not take on additional responsibilities without funding to support them
- A new organizational structure should be considered that includes more clinical and rural participation as well as by HAs and the Ministry of Health
- The DAP should be funded through a multi-source blended funding model that includes annual dues charges to each of the 6 HAs and to private facilities based on their operating budgets; a flat survey fee; a MoH core operating grant; and in-kind support from the CPSBC for administration.

The DAP is critical to ensuring the technical quality of BC's laboratory facilities and providers and an appropriate role for the DAP must be recognized and supported. However, a broader conception of quality is needed to address numerous additional components and there is currently no central authority responsible for leadership in these

areas.

Quality has several dimensions which need to be addressed, including the:

- technical quality of laboratory services (standardization of equipment and processes)
- appropriateness of laboratory testing (the right tests and only the right tests)
- efficiency of laboratory testing and communications, including
    - Extent of repeat testing
    - Unit costs per test performed
    - Unit costs per appropriate test performed
    - Convenience of test processes for the patient
    - Timeliness of results
- qualifications of personnel
- quality improvement culture of the system
- nature and impact of incentives (pricing, payment, etc.)
- appropriate action taken on receipt of the test results
- integration of new knowledge into processes and practices
- replacement of outdated and inappropriate technologies with current and evidence-based approaches.

3.1 Utilization Review and Management

Utilization review and management are key aspects of improving both quality and efficiency. However, because lab services are delivered and managed by multiple providers there is little information to determine whether patients are getting the right tests, at the right time or whether the results are being used to support appropriate medical management decisions. Furthermore, the existence of multiple providers, using multiple tools and technologies, leads to concerns about standardization of tests.

3.2 Standardization

Studies from other jurisdictions (e.g. Germany) have found test duplication rates as high as 30%, most of which was related to a lack of standardization (Seccombe 2003a). Limitations of BC's multiple and incompatible lab information systems—inability to trace a patient from a community-based outpatient to an inpatient setting for example—make it difficult to determine the degree of duplicate testing in BC. Although the precise rate of repeat testing cannot be confirmed, lab service providers may insist on repeat testing because of lack of confidence in test results produced by others when

standardization cannot be assured. Errors in lab testing can occur at three different levels (Seccombe 2003c):

- Pre-analytical – incorrect labeling of a specimen, incorrect sample collection or timing of specimen collection
- Analytical – incorrect calibration of equipment, operator error, or other technical problems
- Post-Analytical – incorrect reporting of a result or delayed reporting of a test result

Once results are reported to ordering physicians, there is still potential for error in interpreting the results and making the correct medical management decisions.

Every test result that is generated by a clinical laboratory has some error associated with it (Seccombe 2003b). The objective should be to reduce the error component to the lowest possible level in order to ensure that the test results do not incorrectly imply the presence—or the absence—of illness or disease. If a test result is biased on the high side – a "positive bias", patients may be getting treatments that they don't really need. If a test result is biased on the low side – a "negative bias", patients may not be getting treatment that they need. Clearly, lack of standardization of test results has serious implications.

In looking at cholesterol testing, the Canadian External Quality Assessment Laboratory (CEQAL) concluded that:

- If all adult Canadians were tested in a laboratory with a 3% positive bias, an additional 1.3M Canadians – including almost 160,000 British Columbians - would be incorrectly added to the "higher risk" category for premature heart disease. The direct and indirect costs of this miss-classification would be $102M nationally, and over $12M in BC (Seccombe 2003a).

In looking at measurement of potassium levels, CEQAL found that:

- A study of potassium measurement in 503 clinical laboratories in Canada indicated that 22.5% would under-report a critically high potassium level due to a negative measurement bias in their systems. Based on these biased lab results, a managing physician might incorrectly conclude that a patient's irregular heart beat was within normal ranges of variation and not requiring immediate attention (Seccombe 2003a).

The implications of a negative bias (under-reporting or the failure to detect illness or disease) could have very serious consequences for patients and for the health care system overall; their health problem might be detected only once it was in a more advanced stage, when treatment was both more complex and less effective, and more expensive.

3.3 Quality Management

Because BC's lab services are not coordinated or systematically managed, it is difficult to get a clear picture of quality and utilization. What we do know is that:

- As of February 2003, there were 151 labs, 108 of them public, and 155 specimen collection stations in BC, 29 of them public.
- Access to diagnostic facilities is perceived to be very good with over 85% of all British Columbians living within five kilometres of a specimen collection station (SCS). Almost 93% of British Columbians live within 10 km, and only 7.4% live more than 10 km from, an SCS. In urban areas such as Greater Victoria and Greater Vancouver close to 100% of the population lives within 5 km of an SCS.
- Changes in population demographics and the need for more effective chronic disease management have led to increased demands for certain diagnostic tests. This volume is driven, not by laboratory providers but by ordering physicians responding to their patients' needs.
- Nonetheless, outpatient lab utilization rates (volume) in BC are higher than elsewhere in the country and growing at a faster rate. At 7.4% average growth per year, utilization is increasing at 6 to 7 times faster than the growth in population. [3] Compared with Manitoba in 2000/01, prior to its reforms, BC's outpatient utilization rates were more than 1.5 times higher.[4]
- Twenty fee items account for 62% of total MSP Laboratory Medicine Billings. (please see Appendix 16.1 for details).
- There is significant variation in utilization of lab services throughout BC.
    - Utilization (services per 1,000 people) is highest in South Vancouver Island Health Service Delivery Area.
    - Utilization is lowest in Northern Interior Health Service Delivery Area.
    - Over the period 1996/97 to 2000/01, the rates of service and expenditure per capita grew in each of the urban, semi-urban/rural and rural classifications. However, the growth in per capita service and expenditure rates was faster in the urban classification than in the semi-urban/rural or rural areas.

3.4 Quality and Utilization Issues Summary

- Utilization review and management are key aspects of improving system quality and efficiency. Because lab services are delivered and regulated by multiple

[3] It is difficult to compare utilization rates across provinces because provinces do not have a common standard for naming tests, few province fund lab services on a per test basis, and those provinces where services are fully regionalized, such as Alberta, do not generally have centralized data collection.
[4] Manitoba rates for 2000/01 were 3.57 services per person compared with BC's 5.6 services per person.

providers and administrative bodies in BC there is little information to determine whether patients are getting the right tests, at the right time or whether the results are being used to support appropriate medical management decisions.

- Inability to track a patient from a community-based outpatient to an inpatient setting make it difficult to determine the degree of duplicate testing in BC
- The existence of multiple providers, using multiple tools and technologies, leads to concerns about standardization of tests. Lack of standardization of test results has serious implications. False positive test results can lead to unnecessary and costly medical interventions while false negative test results can lead to patients not getting the treatment they need.
- Lab utilization rates in BC are higher than anywhere else in the country and growing at a faster rate. At 7.4% average growth per year, utilization is increasing at 6 to 7 times faster than the growth in population.

4. EXPENDITURES AND COSTS STATUS REPORT

In 2001/02 BC spent an estimated $457M on lab services, about 64% on public sector labs and 36% on private sector labs. Of the total, about $202.3M[5] was spent on inpatient lab services, funded by grants to Health Authorities, and $254.5M was spent on outpatient lab services, funded by the Medical Services Plan (MSP). In 2001/02, expenditures on lab services represented 4% of overall Health Authority budgets and 14% of the MSP Available Amount (AA).

Recent inter-provincial comparisons indicate that, at roughly $115 per capita, BC taxpayers pay as much as $25 more per person for lab services than the next highest spending province (Ontario, at $90 per capita) (THiiNC Health Inc. 2002b). Furthermore, as shown in Exhibit 1, at 34% over five years, BC's lab services expenditures per capita have increased at a far faster rate than elsewhere in the country – over twice as much as the next highest province (Saskatchewan).

Exhibit 1: Per Capita Expenditures on Lab Services:

	2001/02	1996/97	% Growth
BC	$116.61	$86.31	34%
Ontario	$90.41	$83.89	8%
Manitoba	$77.97	$72.39	8%
Canadian Average	$77.49	N/A	N/A
Alberta	$74.40	$65.32	14%
Saskatchewan	$73.62	$64.12	15%

Source: (THiiNC Health Inc. 2002a;Gilmour & Associates 2003)

4.1 What accounts for these high expenditures?

Expenditures on lab services are a function of "volume", utilization or demand for services, and "price", the amount paid for services. Inpatient services are paid for through fixed Health Authority grants that reflect the population needs and the complexity of the services delivered. Outpatient services are paid for through the open-ended or uncapped Medical Services Plan (MSP) on a fee-for-service basis.

Hospitals and private community labs both try to maximize the use of their capacity - and to generate revenues – by doing outpatient tests paid for under the uncapped MSP fund.

In 2001/02, MSP expenditures for Laboratory Medicine (outpatient services) were $254.5 million. The largest component of this expense is private labs that accounted for $166.6 million of the total.[6] Two private laboratories—MDS Metro Laboratory Services and BC

[5] Net of MSP revenues

[6] Private labs account for as much as 96% of outpatient lab work in urban Health Service Delivery Areas (HSDAs) and as little as 12% in rural areas (Source: MSP data analysis of utilization by HSDA. Results for Richmond and Kootenay-Boundary respectively.)

Biomedical Laboratories Inc—dominate the outpatient testing sector, with $153.5 million in billings to MSP in 2001/02, or 60% of the outpatient sector. [7] They have seen a 49.5% growth over five years and derive 65% of their revenues from a menu of 20 fee items billed.

Hospital laboratories are attempting to attract more outpatient testing as billing to MSP represents by far the largest source of revenue (other than their base grant) to them (This is well over 80% and in most cases closer to 100%[8]). In 2001/02 they billed roughly $80 million to MSP, representing 31% of outpatient billings. They have seen a 44% growth over five years and derive 56% of their MSP outpatient revenues from the top 20 fee items.

Exhibit 2: Top Twenty Outpatient Laboratory Medicine Fee Items
Source: (Medical Service Plan (MSP) 2003)

Summary Statistics - 2001/02	Revenue	Services
Private Lab Revenues from Top 20 Fee Items	$110,292,375	7,354,417
Total Private Revenues from MSP	$166,554,867	15,278,442
Proportion of Private Lab Revenues in Top 20 Fee Items	66.2%	48.1%
Hospital Revenues from Top 20 Fee Items	$45,107,717	3,001,088
Total Hospital Revenues from MSP	$80,429,322	7,403,883
Proportion of Hospital Lab Revenues in Top 20 Fee Items	56.1%	40.5%
Top Twenty Total Expenditures	$157,253,465	10,541,427
Total MSP for Laboratory Medicine	$254,460,924	24,328,192
Proportion of Top Twenty Fee Items to Total for Laboratory Medicine	61.8%	43.3%

At 44% over four years (1997/98 to 2001/02), the growth in expenditures for outpatient lab services exceeds the growth in inflation (5%), growth in the budget for the MSP Available Amount (AA) (25%), the growth in the budget of Ministry of Health (37%), and the growth in the budget of British Columbia government (21%) for the same period.

Exhibit 3 further illustrates the dramatic growth that MSP lab expenditures have had from year-to-year. MSP expenditures for lab services in 2002/03 are projected to be approximately $279 million dollars[9] Arbitrators awarded physicians a one-time lump sum payment for 2001/02. A comparison of the projected expenditures for 2002/03 with the 2001/02 expenditures, excluding the one time lump sum payment, results in a 17.6% increase in expenditures over the previous year. Even including the one-time lump sum payment in 2001/02, MSP expenditures increased by over 9.5% between 01/02 and 02/03.

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[7] In addition to the $80.4M to public labs, smaller private labs accounted for the remaining $7.5 million.
[8] Personal communication through Health Authority interviews (Pelletier *et al.* 2003a;Carlson *et al.* 2003a;McMillan and Hoefer 2003b;Mckerrow *et al.* 2003a;Edwards *et al.* 2003b;Murphy *et al* 2003b)
[9] Due to lag time in submission of claims, final fiscal year estimates are not typically available until the Fall of the following fiscal year. In this case, Fall 2003.

Exhibit 3: Annual % Change in MSP Expenditures 1997/98 – 2002/03

Year	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
MSP	$176.80	$182.40	$207.70	$224.00	$236.90*	$278.60**
% Change		3.2%	13.9%	7.8%	5.8%	17.6%

Source: (Medical Service Plan (MSP) 2003)
*2001/02 excludes the one-time lump sum payment.
**2002/03 is a projection based on year-to-date information.

The presence of multiple providers in the public and the private sector should mean competitive fee-setting or pricing for lab services, however, this does not happen for a variety of reasons.

Although the final decision on establishing "price"—the MSP fee that is paid for lab services—is made by the Medical Services Commission, allocation and fee decisions within the Available Amount are made exclusively by the BC Medical Association (BCMA) and their relevant sections. (In the case of labs, the section of pathology, the BC Association of Laboratory Physicians (BCALP) [10]). Thus, price is effectively controlled by the relevant specialist group.

There is widespread opinion and evidence that the fee-setting process has not kept pace with developments in practice and changes in technology (Hardwick *et al.* 1993). Fees that include an acquisition, technical and professional component are paid for many simple tests that are conducted on a single specimen and mechanically analyzed. Economic analyses suggest productivity gains in the lab sector of between 1.5% and 2% per year (Hardwick 1998) However, as the costs of providing these tests have dramatically decreased in the past 20 years, the fee-setting processes have prevented the introduction of competitive pricing approaches (Hardwick 2002).

The current structure of setting outpatient prices contributes to growth in expenditures. The government is the single buyer but does not exert any market power. The government pays the same price for all quantities of tests and so does not realize economies of scale associated with higher volumes or lower costs.

In laboratory medicine enhanced revenues come from those areas where the margins—the difference between costs and the price or fee paid for the service—are the greatest. As a result, providers tend to concentrate their service on those test items where volumes and prices are the highest and costs are the lowest. While public and private providers may wish to increase revenues related to high margin outpatient tests, the public sector has an obligation to provide a comprehensive range of services, 24 hours a day, seven days a week, regardless of the cost-to-revenue ratio. That means they also have to provide the more complex and labour intensive tests and serve rural and remote areas, where the costs are highest and/or the economies of scale are disadvantageous.

[10] Prices, or fees in MSC Payment schedule for outpatient services, are developed by the BCALP, approved by the Tariff Committee of British Columbia Medical Association, and, finally, approved by the tri-partite Medical Services Commission (MSC).

Exhibit 4 shows[11]:

(a) the relative share of the total lab service market (as expressed through Ministry of Health expenditures on lab services) held by public (HA) and private providers in each of the HA geographic areas

(b) the relative shares of Ministry of Health outpatient expenditures (MSP funds) going to public and to private sector providers by HA geographic area, and

(c) the relative shares of government expenditures to Health Authorities for (i) outpatient (MSP billings) or (ii) inpatient (HA grants) lab services.

Exhibit 4: Market Share Estimates by Health Authority Geographic Areas

	Ministry Expenditures on Lab Services		Ministry Expenditures on Outpatient Services (MSP)		Ministry Expenditures through HAs for Lab Services	
Health Authority	**Private**	**Public (HAs)**	**Private**	**Public (HAs)**	**HA MSP Billings**	**HA Grants**
IHA	25%	75%	39%	61%	58%	42%
FHA	56%	44%	87%	13%	23%	77%
VCHA	42%	58%	70%	30%	37%	63%
VIHA	43%	57%	70%	30%	40%	60%
NHA	19%	81%	37%	63%	36%	64%

Source: (Medical Service Plan (MSP) 2003;Health Authority Management Information System (HAMIS) 2002)

As shown in the first two columns of Exhibit 4:

- Between revenues from HA grants and fee-for-service MSP revenues, most Health Authorities have the majority of the market share for lab services in their geographic regions, with the only exception being the Fraser Health Region. The dominant role of the public sector in lab services overall is understandable given that a large proportion of lab service—notably, all inpatient service delivery as well as labour-intensive anatomic pathology, short turn around time emergency department service, and complex tertiary care testing programs—is funded only through HA grants, i.e. not covered by a fee under MSP.

In looking at market share of outpatient revenues (second two columns of Exhibit 4) a different picture emerges.

- The private sector is the dominant player in the outpatient market in urban Health Authorities. In the Northern and Interior Health Authorities, the private sector plays a much smaller role than the public sector.

When looking at the proportion of expenditures for lab services through MSP payments

[11] The ratios presented here are derived from databases with different purposes. The MSP database accurately attributes claims to providers and to patient identifiers. However, HAMIS/OASIS databases provide only expenditures by provider, without reference to patient information. The ratios are accurate approximations that may be refined as better, patient-centred databases are developed for all lab services.

and grants to HAs (last two columns of Exhibit 4):

- MSP billings represent less than a 50% share of expenditures to HAs, with the exception of the Interior Health Authority where they represent 58% of lab expenditures. This means that changes to the MSP fee schedule, for example, would have a greater impact on the IHA than on the FHA, where MSP revenues represent only 23% of total lab expenditures through the HA.

Projected Expenditures:

Based on the historical expenditure pattern for lab services and planning assumptions within the Ministry it is possible to project future spending through MSP and HA grants. Exhibits 5 and 6 show lab service expenditures over the last 5 years for which data are available and projections for the next 5 years based on the following assumptions:

MSP growth assumptions:

- 7.4% increase per year
- no price effect (no change in MSP fees over the four year projection period)

Health Authority growth assumptions:

- 2.80% increase per year
- no change in union wages over the four year projection period
- BCCDC (British Columbia Centre for Disease Control) expenditures are excluded from this data since their function is to provide provincial community/public health lab services. This review focuses on personal health care laboratory services.

Exhibit 5: Actual and Projected Expenditures on Lab Services

	ACTUAL					*PROJECTED*				
Year	**1997/98**	**1998/99**	**1999/00**	**2000/01**	**2001/02**	***2002/03***	***2003/04***	***2004/05***	***2005/06***	***2006/07***
MSP	$176.80	$182.40	$207.70	$224.00	$254.50	*$278.60*	*$299.22*	*$321.36*	*$345.14*	*$370.68*
Health Authority	$173.80	$176.70	$179.50	$196.00	$202.30	*$194.00*	*$199.43*	*$205.02*	*$210.76*	*$216.66*
TOTAL without Reforms	$350.60	$359.10	$387.20	$420.00	$456.80	*$472.60*	*$498.65*	*$526.37*	*$555.90*	*$587.34*

Source: (Health Authority Management Information System (HAMIS) 2002;Medical Service Plan (MSP) 2003)Excludes expenditures on provincial public health/community health lab services (BCCDC).

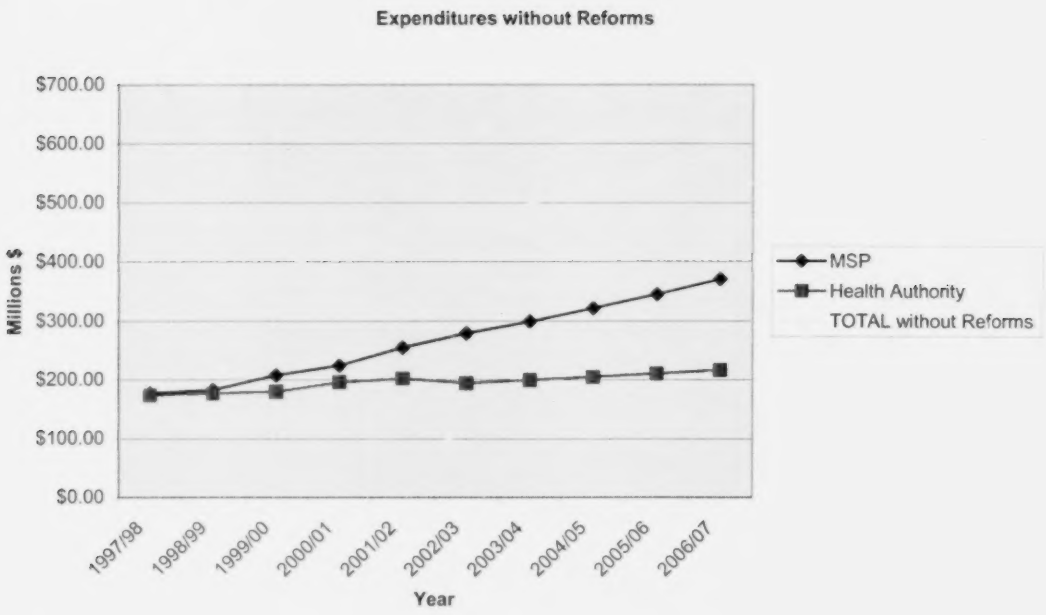

Exhibit 6 shows actual and projected per capita expenditures over the same period.

Exhibit 6: Actual and Projected Per Capita Expenditures on Lab Services

	ACTUAL					*PROJECTED*				
Year	**1997/98**	**1998/99**	**1999/00**	**2000/01**	**2001/02**	***2002/03***	***2003/04***	***2004/05***	***2005/06***	***2006/07***
Per Cap Expenditures	$88.56	$89.84	$96.13	$103.50	$111.55	*$114.38*	*$119.44*	*$124.64*	*$130.03*	*$135.64*

Source: (Medical Service Plan (MSP) 2003;Health Authority Management Information System (HAMIS) 2002) Excludes expenditures on provincial public health/community health lab services (BCCDC).

4.2 Expenditures and Costs Issues Summary

- A recent inter-provincial study estimated total lab expenditures in BC at $115 per capita, compared with a Canadian average of $77 per capita and $90 per capita in Ontario, the next highest spending province.
- The study results suggest that, in 2001/02, BC taxpayers paid $100 Million to $150 Million more for lab services than elsewhere in the country.
- The inter-provincial study showed BC's lab per capita expenditures have increased at a faster rate than anywhere else in Canada – 34% over 5 years, compared with Saskatchewan with the next highest rate of 15% over five years.
- At 44% between 1997/98 and 2001/02, the growth in outpatient expenditures for outpatient lab services exceeds the growth in inflation (5%), growth in the budget for the MSP Available Amount (AA) (25%), the growth in the budget of Ministry of Health (37%), and the growth in the budget of British Columbia government

(21%) for the same period.

- Projected Medical Services Plan expenditures for lab services in 2002/03 are $279 million dollars – a 17.6% increase over the previous year excluding the 2001/02 one-time retro-payment.
- BC now spends almost half a billion dollars on lab services – an estimated $473 Million in 2002/03 and a projected $499 Million for 2003/04.

5. HUMAN RESOURCES STATUS REPORT

5.1 Non-Physician Personnel

There are approximately 3,700 people employed in lab services in the public sector and 1,600 in the private sector, excluding pathologists (Health Sector Compensation Information System (HSCIS) 2001b;MDS Metro Laboratory Services 2003a;Cooney 2003a).

In the public sector, staff compensation accounts for more than 75% of reported expenditures (Health Authority Management Information System (HAMIS) 2002). Medical technologists or "lab techs" represent 65% of lab personnel in the public sector. Exhibit 7 shows a breakdown of lab services workers in the public sector.

Exhibit 7: Public Sector Lab Services Staffing

Job Family	Union	% of Total
Administration	Non-Union	0.4%
Clerk	H.E.U.	1.7%
Cytotechnologist	H.S.A.	2.5%
Lab Assistant	H.E.U.	25.7%
Lab/Health Science Officer	BCG.E.U.	4.6%
Medical Technologist	H.S.A.	65.1%

Source: (Health Sector Compensation Information System (HSCIS) 2001a)

Breakdowns of staffing in the private sector are not available. All technical staff, including medical technologists, employed by MDS Metro are represented by the BC Government Employees Union (BCGEU). Workers at BC Biomedical (BC Bio) are non-unionized.

The majority of public sector (non-physician) lab personnel do not work full time. Some work part time in each of the public and private sectors simultaneously. (Garg 2003) A Fall 2002 health personnel gap analysis conducted by the Ministry of Health projected a shortfall of 15 cytotechnologists, 88 lab assistants, and 222 medical technologists by 2004 based on current demand, training, review of difficult-to-fill positions, estimated retirements, and general attrition (Knight, 2003). At the same time, HA lab reforms based on consolidation and rationalization may lead to staff redundancies. Given the status of reforms in the lab services sector, human resource requirements are still somewhat unpredictable. Efforts should be made to ensure that human resource planning in the lab sector is linked to overall health human resource (HHR) planning efforts underway in the Ministry of Health Planning and, through these, to national HHR planning exercises.

5.2 Compensation

Inter-provincial comparisons of compensation levels are difficult to conduct due to incomparability of job descriptions, differing tax and costing of living environments and wide ranging differences in benefits packages.[12] However the Health Employers Association of BC (HEABC) has conducted wage comparisons for selected benchmark classifications, including Medical Technologists (lab techs). This analysis shows that in terms of hourly wage, BC has historically compensated lab techs at higher levels than most other provinces. Comparative rates for fiscal year 2001/02 are shown in Exhibit 8 (HEABC 2003b).

Exhibit 8: Comparative Compensation Rates for Medical Technologists

Province – Job Classification	2001/02		
	Start	6 yrs	Max
BC Staff level - Grade 1, Level 6	**$21.99**	**$27.41**	**$27.41**
Alberta - Laboratory Technologist I	$20.57	$24.48	$26.16
Saskatchewan - SEIU Technologist I	$18.33	$21.34	$22.05
Saskatchewan – CUPE Technologist I	$18.39	$21.65	$21.65
Manitoba - MAHCP Gen Duty Lab Tech	$16.32	$20.45	$21.40
Ontario – Registered	$19.44	$24.73	$27.37
Quebec – Technologiste Medical	$17.05	$20.98	$24.93
Newfoundland – Lab Tech I	$18.40	$23.14	$23.14
New Brunswick – Medical Lab Technologist 2	$19.57	$24.54	$24.54
P.E.I. - Medical Lab Technologist I	$17.49	$21.44	$21.44
Nova Scotia – Certified Medical Technologist	$23.96	$26.47	$26.47
Yukon Territories - Laboratory Technologist	$23.93	$30.28	$30.28
Northwest Territories - Lab/X-ray Techs	$26.13	$29.63	$29.63
Average of Hourly Rates	**$20.12**	**$24.35**	**$25.11**
BC Rates in Comparison to Canadian Average	**109.3%**	**112.6%**	**109.1%**

Source: (HEABC 2003a)

BC compensates public Medical Laboratory Technologists at rates from 9% to 12% higher than the Canadian average during 2001/02. These interprovincial differences are consistent with other wage class comparisons, such as nursing and physical therapy, and reflect BC's higher cost of living (HEABC 2003c). Competitive salaries have helped BC to avert the serious professional staff shortages experienced in other jurisdictions such as Manitoba (see "Reforms in Other Jurisdictions" below).

[12] For example, the Health Sciences Association, representing the majority of BC's laboratory technologists, recently negotiated a 2.3% wage increase in lieu of long term disability benefits.

5.3 Medical Personnel

Laboratory Medicine Physicians perform diagnosis, exclusion, and monitoring of disease by means of information gathered from the microscopic examination of tissue specimens, cells, and body fluids, and from clinical laboratory tests on body fluids and secretions. Laboratory Medicine includes six medical specialties awarded by examination by the Royal College of Physician and Surgeons of Canada: Anatomical Pathology, General Pathology, Hematopathology, Neuropathology, Medical Microbiology and Medical Biochemistry.

The number of pathologists and the relative proportion of each in BC for 2000 are shown in Exhibits 9 and 10 respectively (Global Tiger Systems Solutions 2001a).

Exhibit 9: BC Pathologists by Subspecialty 2000

Specialty	2000
Anatomical Pathology	79
Neuropathology	4
General Pathology	88
Hematological Pathology	12
Medical Biochemistry	12
Medical Microbiology	22
Total	217

Source: (Global Tiger Systems Solutions 2001b)

Exhibit 10: BC Pathologists by Subspecialty 2000

The College of Physicians and Surgeons 2002/03 Medical Directory lists 213 pathologists, estimated to be about 180 Full Time Equivalents (The College of Physicians and Surgeons of British Columbia 2002;Wolber 2003).

Pathologists are represented by the BCMA under the section of laboratory physicians

(BC Association of Laboratory Physicians – BCALP). One hundred and thirty (130) or about 61% of the pathologists in the province are members of the BCALP.

Compensation:

There are 4 basic modes of compensation for pathologists in the province:

(a) salary (payment is indifferent to workload),

(b) fixed price service contracts (payment is indifferent to workload),

(c) volume-based service contracts (payment is sensitive to workload)

(d) volume-based service contract + MSP billings.

Only 10[13] pathologists in BC work exclusively in the private sector, under salary to MDS. The remaining pathologists work either exclusively in the public sector or in both the private and public sectors. Exhibit 11 shows a breakdown of pathologists by sector and compensation.

Exhibit 11: BC Pathologist Compensation Mode (all numbers are approximate)

Sector	Compensation Mode	Number	Percent	Location
Public Sector	Salary	85	40%	most of VCHA, PHSA
Public Sector	Fixed Price Contract	36	17%	VIHA, rest of VCHA, PHSA
Public Sector	Volume-Based Service Contract	25	12%	VIHA, IHA, NHA, FHA
Public/Private Sector	Volume-Based Service Contract + MSP billing	55	26%	FHA, IHA
Private Sector	Salary	10	5%	MDS Metro

Source: (Tha *et al.* 2003a;Tha *et al.* 2003c;Carlson *et al.* 2003b;Edwards *et al.* 2003a;Mckerrow *et al.* 2003b;McMillan and Hoefer 2003c;Murphy *et al.* 2003a;Pelletier *et al.* 2003b)

Issues in Compensation:

Compensation levels vary considerably depending on mode of compensation. Recently negotiated Provincial Salary and Service Agreements cover the term from April 1, 2001 to March 31, 2004. These agreements are a subsidiary of the current working agreement between the BCMA and Government of BC. Exhibit 12 shows the compensation levels for Pathologists for Service Agreements and Salary Agreements in BC.

[13] There are 10 active pathologists - and 12 in total affiliated - with MDS Metro(Breen 2003).

Exhibit 12: BC Salary and Service Contract Rate Ranges

Pay Range	BC	
	Service Contracts	Salary Rates
Low End	$234,700	$209,600
Mid Range	$264,100	$235,800
High End	$293,400	$262,000

Source: (Ministry of Health Services 2003)

These public sector compensation levels are competitive with those in other provinces. While inter-provincial comparisons of pathologist compensation are difficult due to differing compensation and benefit structures within and between provinces, the Canadian Association of Pathologists (CAP) 2001 income survey indicated BC pathologists were the best compensated in Canada at the time of the survey. This may no longer be the case since renegotiation of pathology compensation levels has since occurred in Saskatchewan, Manitoba and Alberta. In March 2001, Alberta established a 4-step salary grid for pathologists using the Vancouver Hospital grid as a benchmark, arguably making them the highest paid in Canada (Global Tiger Systems Solutions 2001c).

A more recent Ontario survey of pathologist compensation levels (Physician Working Group 2003) noted similar difficulties in comparing pathologists' compensation levels between jurisdictions. The results of the survey are illustrated in Exhibit 13, which shows the average compensation rates (excluding benefits, additional monies for on-call services, isolation and other allowances) for pathologists for other jurisdictions.

Exhibit 13: Pathologist Compensation Levels Between Jurisdictions

Jurisdiction	Alberta 2002	Sask. 2003	Ontario 2002	UK 2001	US 1999
Hospital Remuneration	$285,000	$276,000	$211,000	$303,000	$403,000

Source: (Physician Working Group 2003)

While there are variations in compensation levels across the country, there is also considerable variation within the province due to the ability of some pathologists to supplement their public sector incomes with private sector fee-for-service billings. Total incomes of pathologists in this "hybrid" camp are estimated at well over 2 to 3 times those of the salaried or fixed contract public pathologists.

There is widespread feeling among some sectors of the pathologist group in BC that existing remuneration structures are detrimental to the sustainability of the sector. They submit that the existing approach is highly inequitable, rewarding neither ability nor effort, and that it lacks transparency and accountability. Furthermore, the salary differentials have made recruitment and retention of professionals in teaching and research settings increasingly difficult. The existence of dramatic income differentials has created deep divisions within the pathologist community.

Issues and Concerns:

Human resource shortages are a major concern across the country.

- Shortages of qualified medical, scientific and technical staff were the single most important issue driving the reforms being undertaken in Manitoba (Wright 2003).
- The Society of Medical Laboratory Science predicted a nation-wide shortage of technologists within the next 15 years (Manitoba Health 2003).
- A 1993 Canadian Association of Pathologists (CAP) survey (Treloar 2002) reported 1,203 full-time pathologists in Canada. In 2002 the survey reported a total of 1,089 full-time pathologists, a decrease of 9.5%.
- Approximately 35% of pathologists in Canada are currently in the pre-retirement age group (50-59) (Physician Working Group 2003) and there has been a steady decline in the number of medical graduates entering residency programs in laboratory medicine in the US and Canada (Sullivan 2002).
- Over one third of pathologists in BC's teaching hospitals are 55 years of age or older. Even if all the graduating residents in the next five years stayed with the teaching hospitals, that would meet only half of the projected need for additional and replacement pathologists and would not meet any of the needs outside of the teaching hospitals (Kazemi and Tegenfeldt 2001b).

While the supply of laboratory physicians has been decreasing, the demand for laboratory physicians has been increasing.

- Results of a CAP survey of advertisements for laboratory physicians between 1996 and 2002 showed a clear upward trend in demand. A recent survey of pathologist human resource issues found 16 unfilled pathologist positions at academic centres across the country (Kazemi and Tegenfeldt 2001a).
- Roles of laboratory physicians are expanding. Ongoing advances in science and technology means treatment strategies for many diseases have become more specific, more powerful and more expensive, resulting in a commensurate need for more sophisticated laboratory diagnostics with greater laboratory physician contribution (Physician Working Group 2003).

Recruitment and retention of experienced medical, scientific and technical staff is a concern.

- Non-urban areas of the province experience significant recruitment challenges. Finding satisfying and satisfactory employment for spouses is often a barrier to attracting professionals (McMillan and Hoefer 2003a).
- Recruitment is increasingly becoming a problem in the academic sector with current remuneration structures making academic teaching and research environments relatively unattractive (Tha *et al.* 2003b).

Competitive compensation rates have made BC an attractive place for lab service

professionals. However, attention will need to be directed to planning for future needs if BC is not to experience the same critical shortages in the future as other provinces experience now.

5.4 Human Resources Issues Summary

- Shortages of qualified medical, scientific and technical staff are a serious concern across the country.
    - Recent health personnel gap analyses conducted by the Ministry of Health project a shortfall of over 237 technologists and 88 lab assistants by 2004.
    - Approximately 35% of pathologists in Canada are currently in the pre-retirement age group (50-59) and over one third of pathologists in BC's teaching hospitals are 55 years of age or older. Retention of all graduating residents over the next five years would meet only half of the projected need for additional and replacement pathologists in existing teaching hospitals.
- BC compensates public Medical Laboratory Technologists at rates from 9% to 12% higher than the Canadian average during 2001/02. These competitive salaries have helped BC to avert the serious professional staff shortages experienced in other jurisdictions.
- BC's pathologists are among the best paid in Canada.
- There is considerable variation in compensation levels for pathologists in BC due to the ability of some to supplement public sector incomes with fee-for-service billings. Total incomes of some pathologists are estimated at 2 to 3 times those of those on salaries or fixed contracts.

6. ACADEMIC ACTIVITIES STATUS REPORT

6.1 Training/Teaching

Teaching (the training of new personnel, the transfer of knowledge, and the teaching of new practices and approaches) and research (the pursuit of scientific enquiry, discovery and advancement) are critical to the renewal and sustainability of the lab services system.

Four institutions offer training programs for lab services workers and professionals. Professional programs involve a component of practical, on-site teaching that relies on the Health Authorities' cooperation and collaboration.

The Vancouver Community College offers a five-month Laboratory Assistants' certificate program (Vancouver Community College 2003). Roughly 48 people per year graduate from this program that has been in operation since 1990. The University College of the Cariboo offers a distance education program designed to assist those currently working to become certified as lab assistants.

The BC Institute of Technology trains Medical Technologists in a two-and-a-half to three year program, followed by a 12-month training period at a clinical facility. The diploma program in its current form has been running for three years, with 40 annual projected graduations. BCIT also offers a one-year Medical Laboratory Science Professional Qualifying program. This program is designed as a refresher for internationally trained medical laboratory technologists, or Canadian-trained medical laboratory technologists who have been out of the workforce for a lengthy period (BCIT 2003;Dean's Office 2003a). BCIT also offers advanced certificate training and professional development programs for lab technicians currently employed and wishing to advance their position. The BCIT lab technologist training program was closed in the early 1990's leading to subsequent shortages in lab techs in BC. This situation is only now being remedied with newly trained technologists joining the workforce since the program was reopened.

The University of British Columbia (UBC), through the Department of Pathology and Laboratory Medicine, offers a Bachelor of Medical Laboratory Science in cooperation with BCIT. UBC provides the only specialist physician training in the province.

The UBC Department of Pathology and Laboratory Medicine (DPLM) is made up of 58 faculty members who derive their salaries in whole or in part from the university, funded by the Ministry of Advanced Education, and a further 120 faculty members who are paid through Health Authorities or other sources. Thus, the DPLM is reliant on laboratory physicians in affiliated Health Authorities to fulfill its university mandate. Demands on these clinical faculty members is increasing as the university expands its undergraduate Medical School enrollment and will increase further if an anticipated increased role for laboratory medicine in the curriculum is realized.[14]

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[14] The DPLM reports that "graduating students in two successive surveys have rated Pathology as inadequately present in the [undergraduate medical] curriculum". (Dimmick 2002a)

There are currently 19 residency training spots in UBC's Laboratory Medicine Training program, which is accredited by the Royal College of Physicians and Surgeons (Dimmick 2002b). All pathology training programs are five years in length and include the following specialties: Anatomical Pathology, General Pathology, Hematological Pathology, Medical Biochemistry, Medical Microbiology and Neuropathology. UBC graduates up to 5 pathologists per year (Dean's Office 2003b). Other post-graduate education programs provided by the DPLM include post-graduate scientist program with 75 graduate research students and 10 post doctoral students; instruction of pharmaceutical sciences doctoral students; fellowship education; and Continuing Medical Education programs. The department is seeking to establish a Pathologist Assistant certification program. Such as program would train post-graduate scientists over 2 years, qualifying them upon completion to undertake a significant range of tasks delegated by anatomical pathologists and could help to avert a crisis in pathologist shortages.

The DPLM has a strong research presence within the university with the second largest research grant holdings of any medical department at UBC. However, according to a recent external review, the scope and diversity of the research program brings risks of fragmentation and duplication. The establishment of an overarching research framework and a common core activity for technology applications is viewed as central to optimizing the research program (Gordon *et al.* 2002b).

There are concerns, both within HAs that already have an academic teaching and research role (VCHA, PHSA) and among those that are anticipating such a role in the future (VIHA, NHA, FHA, IHA) that under-resourcing of teaching and research functions jeopardizes the HAs' capacity to fulfill their academic mandate. An external review of the DPLM found that lack of protected academic time for teaching and research is a major barrier to the initial recruitment and subsequent retention of junior faculty members and limits the ability of established faculty members to participate in academic activities (Gordon *et al.* 2002a). Reform plans within HAs that call for funding cuts in lab services have instilled fears among the academic community that they will have a further detrimental impact on the ability of clinical faculty to fulfill their teaching and research roles. HAs preparing to play an academic role are concerned about resources to adequately support the teaching and research functions as service pressures continue to grow.

Under reforms undertaken in Alberta, the academic mandate was perceived to have seriously suffered through funding cuts. The DPLM and its external reviewers have advocated for recognition and protection of teaching and research roles through offset funding of salaries and with job descriptions for clinical faculty that clearly delineate responsibilities and accountabilities and that protect and compensate for academic time. (Only the BC Cancer Agency provides a job description that references and partially protects academic time) (Gordon *et al.* 2002c). In addition to offset funding for teaching and research roles, the DPLM recommends infrastructural support for space, teaching equipment and support personnel.

Both major private sector providers, MDS Metro and BC Bio, have indicated an interest in playing a more significant role in teaching and training.

6.2 Research

Research activities may be divided into three major areas: (a) innovation, (b) adaptation, and (c) production. The University and academic health centres are the core settings in BC for investigator-driven innovation, supported by grant funding agencies such as the Canadian Institutes for Health Research (CIHR) and the Michael Smith Foundation for Health Research (MSFHR). In this area of new discovery, the returns on investment may be spectacular but they are not routine – for example, the structures and actions of viruses or microbes are explored and understood, the Human Immunodeficiency Virus is discovered. Adaptation or applied research occurs at the university and within provider sites such as HA and community labs. In this area of research, new scientific discoveries become health care applications – for example, discoveries about the behaviour of viruses are translated into testing methodologies or treatments, a blood test is developed to detect presence of the virus related to cervical cancer. Production research (laboratory systems) occurs mostly at the provider site and is aimed at improving throughput or productivity – for example, processes are automated, cell sorters are developed that can eliminate time consuming work with a microscope.

For BC's lab services system to remain vital, competitive and sustainable into the future, research of all three kinds must be supported. For production research, where the changes that result actually save resources or costs as processes are refined and replaced by better ones, it is relatively easy to make the case for investment. The opposite is true of innovation research. Here the returns in terms of cost-saving are not only indirect, they are often invisible. This aspect of research is one that requires conscious resource application and support for its survival and should be addressed through the activities of the major research granting agencies such as CIHR and the MSFHR.

At present, with competing pressure for service in most service delivery sites, the public lab system has very limited ability to make the necessary investments in adaptation and production research required to maintain currency and meet future needs.

BC's lab system has the potential to be among the best in the world. Researchers from UBC have repeatedly been among an elite pool of international prize winners in major academic competitions and are recipients of major peer-reviewed national grants competitions. If BC is to achieve its potential on the world stage and to create to a future-oriented lab services system, investments in research will need to be made.

6.3 Academic Activities Issues Summary

- Academic institutions are reliant on professionals employed by Health Authorities to assist in fulfilling their teaching mandates. Only the BC Cancer Agency provides a job description that references and partially protects academic time.
- Demands on clinical instructors and faculty members are increasing as UBC expands its undergraduate Medical School enrollment and technologist training programs expand.

- Health Authorities are concerned that under-resourcing of teaching and research functions jeopardizes their capacity to fulfill their academic responsibilities.
- An external review of the UBC Department of Pathology and Laboratory Medicine found lack of protected academic time for teaching and research was a major barrier to the recruitment and retention of junior faculty members.
- With competing pressure for service in most delivery sites, the public lab system has very limited ability to make the investments in adaptation and production research required to maintain currency and meet future needs. If BC is to achieve its potential on the world stage and to create to a future-oriented lab services system, investments in research will need to be made.

7. INFORMATION SYSTEMS STATUS REPORT

There are as many as 27 or more different lab information systems or versions of systems in use by physicians and HAs across the province (Schinbein 2003).

A small number of vendors dominate the clinical information market within HAs[15]. Most of the HA clinical information systems include the capacity to order and report test results electronically, however, the utility of these systems is usually limited to the institution itself for two reasons: (a) they typically generate their own unique person/patient identifier, which is not consistently reconciled to Personal Health Number (PHN), the province-wide unique patient identifier, and (b) they do not have the capacity to link with other versions of the system or other clinical or lab information systems (Cooney 2003a;Mckerrow 2003;Cooney 2003b;PathNET Electronic Laboratory Reporting 2003).

There are three competing alternatives for test result distribution between sites, including physicians' offices, PathNET, MediNET and the PHSA CAIS/PHAIS II system.

PathNET is a joint venture between the two private sector leaders in community lab services in BC - BC Bio and MDS Metro, developed over more than 6 years. PathNET is a secure, Web-based system built around the BC Ministry of Health's Lab Test Standard for information sharing that delivers free-of-charge lab test results to over 2,600 physicians electronically. PathNet maintains a repository of test results and is developing capacity for desktop electronic order entry by physicians.

Lab results shared through PathNET come from BC Bio, MDS, and St. Mary's Hospital labs. The significant size of the lab services delivery market shared by BC Bio and MDS Metro, means that PathNET is already capable of transmitting about 60% of all outpatient lab test results, and over 30% of all test results. In a pilot project with Vancouver Hospital, and with the signed agreement of participating patients, PathNET is facilitating Emergency Department access to historical lab test results related to a group of 50 physicians. PathNET is currently being reviewed by the Ministry of health for compliance with Pharmanet. PathNET already has the capacity to deliver text reports, developed as part of its surgical pathology report functions. Linked lab and pharmaceutical information would constitute a formidable base for a comprehensive electronic health record (EHR).

MediNET is a privately owned and operated BC based company that provides lab test results to the physicians' desktop at no cost to physicians. MediNET is in the software services business only. Their distribution system includes 1,450 physician offices and 5,100 physicians.

The sources of lab test results include all five publicly funded labs in Victoria (formerly the Capital Health Region), Campbell River, Vancouver Hospital, New Westminster,

[15] Of these, Cerner and Meditech are most widely in use.

Maple Ridge and St. Paul's hospitals. In addition, discussions are ongoing with Children and Women's and Surrey Memorial Hospitals.

CAIS/PHAIS II from PHSA is a public sector-developed system that can distribute lab test results to physicians. Currently the BC Cancer Agency collects lab test results from a number of the publicly funded labs as well as those that are generated within the Cancer Agency. At present, these results are only available to Cancer Agency physicians who have direct access to CAIS, but PHSA has been experimenting with providing Web access, much like PathNET. The current CAIS system gives users a view and print option only. It is anticipated that the new PHAIS II system will allow for a HL7 LTS type download function.

Issues and Concerns:

The lack of a comprehensive or linked lab information system has marked consequences for how lab services get delivered, how the system is managed, and how much it costs. There is little information to determine whether patients are getting the right tests at the right time or whether the results are appropriately used in medical decisions. This concern is especially important in patients with complex, chronic illnesses. Moving from one site of treatment to another almost always means repeating tests (even ones recently done) since lab results do not accompany the patient and lack of standardization of results, as noted above, makes clinicians skeptical or uncertain about using another lab's results.

Lack of information system connectivity makes it difficult to establish integrated care since referring physicians, independent providers, and facilities within the HA are all using different sets of data, laboratory equipment, standards, and patient records. Administrators at the regional and provincial level are severely restricted in their ability to monitor, evaluate, and plan lab services since there are few data sources and those that exist are not consistent, comprehensive, or standardized. A unified, patient-centred information system is needed.

Although it is difficult to verify the implications of information system failures on lab services utilization and overall expenditures, it is claimed that:

- Approximately 33% of lab tests are ordered inappropriately
- Approximately 11% of tests ordered are reordered due to lost results, and
- Approximately 20% of tests ordered are not performed because the patient does not show up for sample collection (Schaefer 2003b).

Experimental work with interactive, "intelligent" test ordering software produced dramatic results:

- 45% fewer lab tests were ordered
- 25% fewer specimen collections were required to complete investigations
- 34% fewer referrals to specialists were required, and

- time to reach a diagnosis was reduced by over two thirds (3.2 days to 1 day) (Schaefer 2003a;Smith and McNeely 1999)

Opportunities:

A basic, province-wide lab information system—not necessarily imposition of a single system but, instead, connectivity to create a "system of system"—would need to include or support:

- Unique patient, referral agent, and provider identification
- Results reporting
- Access to comprehensive patient diagnostic information
- Linkage potential to a broader patient record
- Results and record tracking
- Provider billing
- Data export
- System performance monitoring and outcome evaluation, and
- Have the capacity to support additional functionalities such as electronic order entry and electronic utilization management.

In developing a provincial approach to lab information, numerous issues would need to be addressed including:

- Technical issues relating to hardware and software
- Role issues relating to Ministry, Health Authority or others ownership and operation of health information systems
- Conformance and compliance issues related to imposition and implementation of standards or technologies
- Infrastructure required to support technologies
- Asset acquisition and ownership
- Protection of patient privacy in the context of access to comprehensive medical information when required

Despite the scope of the challenge and the normal tension between centralized and decentralized bodies, the Health Authorities would likely be strong supporters of province-wide LIS strategy for a number of reasons:

- Each of the HAs is independently investing in LIS for their own regions. A coordinated and centralized approach would ensure connectivity/compatability between HAs and across the province
- HAs need better information in order to control lab services utilization and costs.

- HAs are interested in the development of the electronic health record (EHR), and the LIS is a critical feature.
- The LIS will impact the broader, strategic health care agenda since it helps build an integrated approach to health service delivery and administration.
- Linked electronic records, of which the LIS is a key component, will improve patient care and outcomes, direct responsibilities of the HAs.
- Development of a province-wide LIS presents an opportunity to leverage monies from the federal government (Canada Health Infoway) that will help with the development of the EHR.

The development of a comprehensive, province-wide LIS could represent a genuine "win" on the health care reform front, and one that involves a partnership among the HAs and the Ministries.

7.1 Information Systems Issues Summary

- There are 27 or more different lab information systems or versions of systems in use by physicians and HAs across the province with little or no capacity to share information between them.
- There is little information to determine whether patients are getting the right tests at the right time or whether the results are applied to making the right medical decisions.
- The lack of an integrated and standardized information system means patients' tests are often repeated unnecessarily, test result information has to be re-inputted manually at different sites, and a comprehensive picture of a patient's lab history is not available.

8. SYSTEM CORE ASSETS

In addition to the teaching and research functions that must be protected to ensure the long term sustainability of lab services, there are at least two other core assets that require protection: (a) public health laboratory services and (b) tertiary laboratory services. As well, consideration needs to be given to laboratory services that form part of the Canadian Blood Services (CBS).

8.1 Public Health Laboratory Services

Although this report is focused on patient-specific laboratory services, it is critical that changes to this "personal health services" component of laboratory services do not jeopardize the viability and sustainability of the public health component. The public health system, under the aegis of the provincial BC Centre for Disease Control (BCCDC), is responsible for conducting, managing and reporting on tests undertaken with the entire population's health and safety in mind, tests such as those for tuberculosis and HIV/AIDS as well as those for new and emerging public health threat such as West Nile Virus (WNV) and Severe Acute Respiratory Syndrome (SARS). BCCDC does provide patient-specific, personal health testing for certain specific infectious diseases with public health implications. The network of public health labs and linked hospital and community labs under the oversight of the BCCDC is critical to comprehensive disease surveillance, outbreak identification and management, and early intervention.

An excellent public health laboratory (PHL) is critical to identifying and limiting threats to the health of BC residents. PHL activities, in concert with non-laboratory public health programs, play a critical role in reducing rates of preventable mortality and morbidity.

The BCCDC is a relatively small and specialized component in the overall laboratory system, however, its role is not only province-wide but contributory and essential to national population and public health strategies. The creation and maintenance of a critical mass of expertise and technology, linked to a strong academic and research base, is essential to BCCDC's continued leadership role in public health – health promotion, disease prevention, health protection and population health - both in the province and in the country. While distinct from personal health services, core public health lab services link intimately with, and support functions of, the community and hospital laboratory system. Any changes to laboratory services must consider the impact on public health programs to ensure that these are not adversely affected.

8.2 Tertiary Laboratory Services

A number of specialized laboratories located in major teaching hospitals (primarily within VCHA and PHSA) and other publicly funded agencies (BC Center for Disease Control, Canadian Blood Services) provide specialized testing on a provincial basis. Due to the portability of almost all specimens, centralization of testing procedures (and where applicable, of expert "interpretation" of test results) is feasible without compromising access by patients to these services. Advantages of such centralization include:

- *Access to "leading edge" tests requiring highly specialized equipment, facilities, and expertise (so called "tertiary" tests).* A number of the laboratories offering such services are also directly involved in research, and may in fact, share equipment and staff across service and research roles.
- *Cost effectiveness and quality.* In some cases, "provincial" laboratory services are not tertiary in nature, but are offered in one laboratory (or a small number of laboratories) in order to assure consistently high quality and/or to provide a cost-effective service.

Some examples of laboratory testing that is provided on a provincial basis include:

- Most virology testing
- Genetic testing
- Cytopathology
- Prenatal screening (e.g. triple marker)
- Newborn screening tests (e.g. PKU)
- Neuropathology (a referral service for neurological anatomic pathology)
- Complex serology investigation

Recognition of the important, and potentially expanded role of specialized, cost-effective laboratories that offer services on a provincial basis, must be considered as a vital part of the renewed laboratory system for the province. These programs, offered through HAs, are not amenable to funding by population-based formulae since program costs are significant and fixed (base investments in expertise and technologies are unrelated to the size of the population served). A program funding approach is required to ensure adequate and protected funding for these vital programs.

8.3 Canadian Blood Services (CBS)

Currently, CBS provides a range of essential provincial testing services, including prenatal Rh testing, Hepatitis B prophylaxis programs, and serology testing services. The operating costs are covered by the BC Ministry of Health Services. Also related to blood services, hospital transfusion services will soon be required to comply with new federal regulations, as new Health Canada standards come into effect in early 2004. An integrated hospital transfusion network model should be developed in anticipation of the changes required to meet these new quality and licensing standards. The status and operating models for these blood service requirements should be reviewed as part of a comprehensive consideration of lab services.

8.4 System Core Issues Summary

- The creation and maintenance of a critical mass of expertise and technology, linked to a strong academic and research base, is essential to the BC Centre for Disease Control's continued ability to protect the population from such public health threats as the West Nile Virus and Severe Acute Respiratory Syndrome (SARS). Reforms to personal lab services must ensure that this vital public health function is acknowledged, preserved and supported.
- Specialized tertiary level laboratories, such as those for genetic testing, complex serology and virology, and neuropathology, offer services on a provincial basis that are a vital part of the laboratory system and are not amenable to funding by population-based formulae.
- Population-based funding does not adequately address the high fixed costs of providing these essential specialized programs.

9. HEALTH AUTHORITY LAB SERVICES

Each of the province's six Health Authorities has either undergone, is undergoing, or is planning to initiate reforms to its laboratory services programs. These reforms are driven by a number of factors, including:

- Increasing demands for service
- Concerns about quality
- Health Authority restructuring
- Funding pressures

The following section provides an overview of the reforms completed, underway, or planned by Health Authority based on interviews with each of the six Health Authorities. HA Chief Executive Officers were contacted and a request was made to meet with the relevant Vice President. Participation at the meetings was at the discretion of the HA. Participants were asked to:

- Provide an overview of the
  - objectives,
  - approach, and
  - timelines for lab reforms within their region.
- Identify
  - key functions of the lab services system overall
  - core assets in the system, and
  - opportunities for coordination and collaboration across the province.

9.1 Northern Health Authority:

Status of Reforms:
The Northern Health Authority has completed reforms of its laboratory sector. These reforms were aimed at saving 20% in expenditures over 3 years (10-6-4) without affecting quality of service. They were based on agreement on service levels (turn around times, access, etc.), and comprehensive workload benchmarking. As elements of its reforms, the NHA achieved some consolidation and centralization, worked to standardize equipment within the region, and supported cross-training of technologists (lab/x-ray)

Issues and Concerns:
Key concerns for the NHA include:

Ability to provide service to sparsely populated region: The region's population is dispersed over a wide geographic area - 7% of BC's population is spread over 64% of the province's geographic area. The HA now operates 25 labs, most of which are staffed by fewer than 3 people and some only a part time basis. Reliable specimen

transportation is a major problem and has impeded further consolidation efforts.

Ability to fulfill academic mandate: The HA will take in its first cohort of undergraduate students in September 2004 and has not yet completed the impact analysis or costing. The HA has concerns that, without adequate funding, the academic mandate will be lost within competing service delivery imperatives.

Specialization and referral: NHA sees potential for province-wide agreement on levels of lab service provision that would designate centres of expertise and specialization and set protocols for service referral. This would clarify what tests need to be referred out to "higher order" facilities and expertise, clarify what test menus and capacities need to be in place at each "level" facility, reduce redundancies in specialized capacity where they exist, and optimize patient care.

Lack of a comprehensive lab information system (LIS): The NHA believes that a single provincial LIS is not desirable or implementable given the existing diversity of applications. However, the establishment of core data elements, standards, system connectivity and the creation of a common database are viewed as essential to improving utilization and effective system management.

Recruitment and retention of professional staff: Eight pathologists serve the entire geographic region. It is difficult to find replacement professional staff, both pathologists and technologists, with limited career growth opportunities, excessive work demands (significant on-call requirements), and inability to find meaningful work for spouses as impediments to successful recruitment and retention to the region.

The prospect of further cuts to lab services: The NHA has already completed its lab reform exercise and is concerned that the system cannot withstand further cuts. Unplanned competing budget pressures include increases in: energy costs, long term disability premiums for staff[16], and Workers Compensation Board premiums.

Opportunities:
The NHA sees many opportunities for improved management and coordination including sharing of best practices in service delivery and staffing, developing a province-wide LIS linkages, health human resource planning, and fulfillment of academic teaching and research roles. The NHA would like to be a more active participant in continuing education opportunities and knowledge exchanges, however distances and travel costs are a significant impediment to participation.

9.2 Vancouver Island Health Authority:

Status of Reforms:
Lab services reforms in VIHA were driven by provincial restructuring, service realignment imperatives/medical drivers, and budget pressures. Reforms were supported by the development of guiding principles including patient-centred design and a

[16] As noted above, these long term disability benefit increases are not felt by HAS members who recently negotiated a wage increase in lieu of these benefits.

philosophy of efficiency-oriented improvements, engagement of key players, including medical leadership and unions, communication of plans and progress to affected and interested parties, and a managed, pragmatic approach to change. As elements of its reforms, VIHA created a Regional Laboratory Council (June 2002), achieved considerable equipment standardization, centralized some services, downsized staffing and improved workforce adjustment over multiple sites. Consultation with both providers and clients contributed to successful management of reforms. Some collection sites were closed (Saanich Peninsula) where other access options were available, while others were retained or enhanced (Gulf Islands) so as to minimally inconvenience patients. The HA continues to work to rationalize services, including working to create a single medical administration for lab services within the region, to optimize capacity, and to repatriate service provision.

Issues and Concerns:
Issues identified by the Vancouver Island Health Authority include:

Ability to fulfill academic mandate: VIHA will begin to fulfill an undergraduate medical teaching role in September 2004. Like other HAs, VIHA is concerned that the new demands of teaching will compete with service delivery pressures among clinical faculty. VIHA already has a successful experience in training medical technologists with NAIT (the Northern Alberta Institute of Technology) but acknowledges that this teaching commitment requires dedication of resources.

Lack of a comprehensive lab information system (LIS): Several LIS systems are used across the HA and connectivity and seamless record transmission are a problem. A comprehensive, province-wide LIS is strongly recommended to support improved patient care and effective utilization management.

Integration of lab services: Studies within VIHA have demonstrated the impact of effective laboratory service delivery on overall patient management (Ganske 2003). Improving turn around times (TAT) can facilitate management of emergency department cases as well as promoting efficient patient discharge: timely turn around of lab test results can determine whether patients require admission, continued inpatient care, or whether they are ready to be managed in the community. Inability to link inpatient and outpatient lab services and results and to apply them to effective patient and health service system management results in system inefficiencies.

Opportunities:
VIHA has been experimenting with strategies to improve test TAT, including the introduction of point of care testing, whereby patients monitor and report test results on selected signs and symptoms using hand-held diagnostic devices. Appropriate management of such technologies can enhance patient care by improving access to testing and test results.

VIHA has identified several opportunities for improved coordination through elimination of separate funding and administrative streams for inpatient and outpatient services, and provincial investments in sharing of best practices, standardization, and common information systems.

9.3 Vancouver Coastal Health Authority:

Status of Reforms:
On January 10, 2003 the VCHA announced the launch of a Laboratory Medicine Services Review. To lead the review, the VCHA created a 10-member project team with representation from laboratory services, physicians, and administration. The project has a specific target of $12 million in savings from an overall budget of $68 million (a reduction of around 18%) to be achieved by March 31, 2005. The goal of the review is to reduce laboratory costs through consolidation of services, while maintaining or improving existing levels of quality and timeliness, as well as the academic activities associated with laboratory service delivery. All 12 public laboratories funded by VCHA are within the scope of the review. The review commenced with a visioning workshop by the Project Team designed to identify guiding principles and objectives. Workshops, involving staff, physicians, unions, other stakeholders and external experts, to review potential laboratory service delivery models and to analyze possible directions for consolidation are part of the review exercise.

Issues and Concerns:
Issues identified by the Vancouver Coastal Health Authority include:

Inpatient versus outpatient care: VCHA sees opportunities for efficiencies within its inpatient operations, however, the HA is concerned that concentration on reforms on "one side" of the lab service system do not achieve the advantages of creating a single administrative and funding stream and a true "system" for all lab services. This means patients are artificially distinguished depending on their inpatient or outpatient status and reduces the prospect of seamless care across the health care continuum. True economies across all lab services cannot be achieved without consideration of both the inpatient and the outpatient components of the system.

Ability to fulfill academic mandate: VCHA is concerned that cuts to the inpatient lab services system may jeopardize fulfillment of its academic teaching and research mandate. While there are costs associated with teaching requirements, VCHA sees benefits associated with fulfillment of its academic mandate in terms of service quality and currency with evidence-based practice among its professional staff.

Ability to recruit and retain experienced professional staff: Experienced lab techs are seen to play a central role in efficient service delivery as they can manage much of the work that would otherwise fall to pathologists. Experienced lab techs are also seen as key players in fulfilling the HA's teaching role as they contribute significantly to teaching undergraduate physicians in the technical aspects of laboratory science.

Opportunities:
VCHA sees many opportunities for specialization and consolidation of lab services, both within the HA and across the province. In addition to an internal review and rationalization exercise (agreement on core site service requirements, related test menus, etc.), a coordinated consensus approach to determining what tests can and should be provided where would contribute to the efficiency and effectiveness of the system province-wide. Once there is agreement on where specialized lab services should be

provided, investments in robotics and other technologies should follow in order to maximize the currency and efficiency of the public sector.

9.4 Provincial Health Services Agency:

Status of Reforms:
Building on work done at the provincial level, PHSA is undertaking reforms aimed at creating "a system that is efficient, effective, of high quality, comprised of academic and research components and maintains a leadership role in academic and service delivery" (THiiNC Health Inc. 2003). The reform approach involves a "current state assessment", visioning exercise aimed at developing a roadmap for the future, and a cost/benefit analysis outlining payback for the plan. It is anticipated that greater rationalization of roles and responsibilities of the four major lab services providers within the authority can be achieved.

Issues and Concerns:
Issues identified by the Provincial Health Services Authority include:

Protection of provincial public health mandate: Through the BCCDC, the PHSA is responsible for fulfilling the province's public health mandate and contributing to national public health efforts. The Public Health Laboratory consists of a unique set of population level activities that must be carefully monitored and protected while major changes in personal health care laboratory system are carried out.

Funding and incentives: Fee-for-service billing for outpatient lab services is seen as a poor provincial expenditure management approach that rewards providers for high volume, low cost tests. The majority of provincial payments, and particularly those for the low cost/high margin fee items, go to private sector providers, thereby losing opportunities for public sector reinvestment. A rational, integrated system that permits management of all funding streams within a single administration is preferred.

Lack of a comprehensive LIS: The PHSA does not have an integrated LIS and some of the existing systems are significantly out of date. Additional resources are required to support the PHSA, and other HAs in modernizing their lab information system.

Lack of test standardization: The province currently employs numerous reference systems for laboratory results and is an outlier in this regard among the Western provinces, all of which use a common, internationally recognized standard reference system. The failure to standardize results leads to considerable test duplication and limits the potential for decentralization of testing from PHSA facilities. If the BCCDC or BCCA, for example, cannot trust the results from another lab, the tests have to be repeated or simply consolidated centrally.

Ability to fulfill academic mandate: There are concerns that cuts to lab services will erode the province's academic mandate as service demands compete with teaching and research commitments. Pathologist compensation structures make public sector academic positions much less appealing than higher income private sector roles.

Lack of quality standards: Without the imposition of realistic guidelines lab service providers are driven to deliver all results on a "STAT" basis. Agreement needs to be reached on appropriate turn around times.

Lack of policy forum and leadership: With the advent of numerous new technologies, notably in the area of genomics and proteomics, there is an increasingly urgent need for policy direction on applications, access, and funding: in which cases should these tests be employed? Who should provide them? How should they be paid for? There remain several areas of laboratory service where policy decisions have not yet been made. A provincial advisory forum and subsequent government decisions regarding technology applications are required.

Opportunities:
The PHSA sees opportunities for better coordination and management with the creation of a single funding and administration pool for all lab services within the region; for provincial standardization of processes, testing and nomenclature; for agreement on applications and acquisition of new technologies; and for better use of human resources, such as laboratory scientists, in lab service delivery.

9.5 Interior Health Authority

Status of Reforms:
The IHA has a widely dispersed population and network of lab service providers across the region. The HA is in the early stages of reviewing lab services with a view to rationalization among relatively recently amalgamated health service delivery areas (HSDAs) and facilities. Although geography presents an impediment to consolidation within the region, efforts to consolidate within HSDAs are meeting with some success and further progress across the region as a whole is anticipated as a process for planning and coordination gets underway. The HA has created a lab services coordination council where regional objectives, issues and concerns may be addressed.

Issues and Concerns:
Issues identified by the Interior Health Authority include:

Inpatient versus outpatient services: IHA derives significant revenues from fee-for-service billings to the MSP for outpatient services. These revenues are used by the HA to offset inpatient lab service costs. There are concerns that cuts to the "outpatient side" of the patient care continuum would have a significant impact on the HA's bottom line. Outside of Kamloops and Kelowna, the HA is the major provider of outpatient services in the region.

Lack of a comprehensive lab information system (LIS): There are multiple different lab information systems within the IHA and connectivity is a major problem. The discontinuity of information flow between the private and public sector providers and information flow in and out-of region are problems. Re-entry of key patient information, transmission of hand-written reports, and paper-based file management are time-consuming and costly to the system.

Lack of comprehensive cost information: IHA does not yet have a good sense of the comparative costs of lab service delivery across the region. Different definitions of services and methods of calculating costs have made it difficult for the HA to derive unit cost data and determine cost-effectiveness of service provision in facilities of differing sizes across the region (for example, determining the trade-off between specimen transportation costs and site service provision of a limited number of tests).

Staffing: IHA has not had significant problems attracting staff to the region, however, there are concerns for the future. The existing staff cohort is dedicated and experienced. Fewer than 200 of the lab services staff in the region are under the age of 30. The HA fears that replacing these staff with inexperienced new staff will mean doubling or tripling the workforce to achieve the same throughput.

Opportunities:
The IHA sees considerable opportunities for improvement through the development of a province-wide lab information system that can replace the current labour-intensive paper-based reporting. Standardization of testing, utilization and cost analysis would support the region's rationalization efforts as well as facilitate province-wide service integration and coordination. Effective quality management strategies could lead to decisions to drop some ineffective tests from test menus province-wide, while the volume of other tests, such as those needed to support effective chronic disease management, might be increased. Better coordination of human resource planning, including the placement of practicum students which can promote regional recruitment efforts, would benefit the region.

9.6 Fraser Health Authority

Status of Reforms
Although FHA has been recently restructured to merge previously existing authorities, the Fraser Valley has a long tradition of regionalized lab service delivery. FHA works in close association with the CJ Coady group of pathologists (BC Biomedical) who have been providing service to the region for over 30 years. The region has created a Lab Working Group that meets regularly to review operational and strategic issues and to plan strategies to address them. FHA has had considerable success in rationalizing its lab services through: managing all sites in the region as one lab service; creating a lean and effective management structure; identifying levels of service required at each site and specializing and consolidating where possible; standardizing equipment and processes (thereby (a) reducing the need to re-test to ensure inter-site comparability and (b) facilitating inter-site staff mobility); managing utilization through protocols and special authority screens; and by realizing bulk purchase savings on supplies and equipment wherever possible.

Issues and Concerns:
Issues identified by the Fraser Health Authority include:

Lack of a comprehensive lab information system (LIS): There are five separate lab information systems within the FHA and limited linkages to private physicians'

offices. Laboratory information coming from outside the region – for example, all referral work – must be re-entered to the manually. This is not only labour intensive, it leads to possible human error, mis-interpretation and mis-classification.

Inter-Authority referrals: FHA is increasingly being billed for what were once recognized as tertiary or referral level services provided by VCHA and PHSA. Agreements need to be reached regarding what level and types of tests should be provided within FHA, or referred out, and funding adjustments should be made. Inter-regional billing adds unnecessary transaction costs to the system.

Opportunities:

FHA sees opportunities for improved coordination and sharing of best practices across the province. Central leadership around a provincial lab information system is essential. Improved, province-wide standardization is desirable, however some flexibility is desirable to ensure ongoing innovation and renewal.

10. PRIVATE LABORATORIES

There are several small, independent physician-owned private laboratory facilities in the province, such as Valley Medical Laboratories in the Okanagan and Prince George Pathologists in the North. However, the private sector lab market is dominated by MDS Metro Laboratory Services and BC Biomedical Laboratories Ltd., with 37% and 23% share of the outpatient market respectively and collectively account for 88% of the private sector outpatient market. Both companies operate state-of-the-art laboratory facilities in BC. With specimen collection stations in most urban settings and 24 hour or less turn around times for most common, high volume tests the private labs offer convenience and timely service for patients and ordering physicians.

10.1 MDS Metro Laboratory Services

Now headquartered in Burnaby, MDS Metro was established in Vancouver as Metropolitan Biomedical Laboratories in 1960. In the mid-1980's MBL joined forces with BC-based McNair Clinical Laboratories and in the late 1980's became part of MDS Inc., a Toronto-based international health and life sciences company employing over 11,000 people worldwide.

MDS Inc operates three distinct industrial segments: (1) Life Sciences (including drug discovery, specialized analytical instruments, sterilization technology), (2) Health (including diagnostic services, management of hospital labs under contract, distribution of medical products), and (3) Proteomics (research and development in molecular causes of disease). Diagnostic services represent 30% of total revenues for MDS Inc. Areas of future growth for MDS Inc include:

- Building on its leadership position in North America
- Growing its US market through partnerships
- Expanding diagnostics globally
- Exploring opportunities in diagnostic assays, and information integration
- Expanding esoteric and specialized testing

MDS Inc reported its first quarter financial results in early March 2003, with basic earnings per share up 31% from the same quarter of 2002 (MDS Metro Laboratory Services 2003b).

MDS Metro operates 80 specimen collection stations in BC, most in the Lower Mainland (40) and on the Island (30) but with several in smaller communities such as Terrace, Dawson Creek, Nelson, and Sechelt. In addition, MDS collects specimens from more than 80,000 elderly or infirm patients at home or in long term care facilities. MDS operates a no-charge courier service that picks up over 1 million specimens destined for both their own and public testing facilities. In 2002, MDS served over 2.2 million patient and performed over 9 million tests. MDS Metro employs 12 pathologists (about 10 FTEs) and more than 900 employees across the province.

MDS operations in the Lower Mainland are not only accredited by BC's Diagnostic Accreditation Program but also by the College of American Pathologists, the "gold standard" for accreditation.

MDS Metro strongly believes it has the expertise and capacity to perform some outpatient tests currently provided only by public sector labs such as Prothrombin Gene Mutation, Acetyl CoA, and Facor V Leiden. Widening access to these tests would, in their view, free up vital hospital resources while at the same time increasing access and reducing travel times for patients.

In collaboration with its partners MDS recently opened the MDS Metro - University of Victoria – Genome BC - Proteomics Centre at the new Vancouver Island Technology Park.

10.2 BC Biomedical

BC Biomedical is owned and directed by Dr. C. J. Coady Associates, a group of pathologists and laboratory scientists who provide both inpatient and outpatient services in the Fraser Valley. The outpatient services provided by BC Bio serve over 1.5 million patients each year. Like MDS, BC Bio offers mobile community lab services for home- or institution-bound patients and no-charge specimen transportation services. BC Bio employs just over 40 pathologists (about 38 FTEs) and over 650 staff (BC Biomedical Laboratories 2003).

In 2002, BC Bio was recognized by the Report on Business Magazine as the best company to work for in Canada (Brearton and Daly 2002).

Since its inception in 1958, the Coady group has advocated an integrated, regionalized model for delivery of laboratory services in the Fraser Valley. Providing professional leadership within the hospitals in the region, the Coady group has been instrumental in the development of a common vision and approach for quality assurance and control, regional instrument selection, purchasing agreements, and service contracts, and rationalization and standardization of testing across all sites. This fully integrated role for Coady professionals has resulted in public sector gains in terms of rationalized service delivery, and has facilitated an effective and collaborative distribution of laboratory work in the Fraser Valley.

System Improvements:

The private sector continues to seek and invest in opportunities for service improvement. For example,

- BC Bio and MDS jointly developed, and now operate, PathNET, an information system that provides electronic lab test results free-of-charge to over 2,600 physicians and three emergency departments in BC.
- MDS and Victoria-based Clinical Intelligence Corporation have developed and piloted a Lab Advisory System that assists ordering physicians with test selection

and result interpretation (Smith and McNeely 1999).

- Valley Medical Laboratories are involved in hemoglobin A1C testing, an initiative to improve diabetic patients' compliance with testing.

11. REFLECTIONS ON REFORMS IN OTHER PROVINCES

Lab service reforms have been undertaken in many other jurisdictions and in all provinces from Ontario west. It is difficult to draw conclusions or lessons from reforms in other countries due to the very different underlying policy and administrative structures. However, there are sufficient commonalities in basic policy and legislative structures across Canada, that some useful information may be gleaned from observations on other province's reforms. The following section reviews the key features of these reforms from the perspective of BC's principles and goals for lab services.

11.1 Ontario

Ontario's lab services are provided by hospitals and private, community facilities. Hospital-based inpatient and outpatient services are funded through grants to hospitals, while outpatient services are funded by the Ontario Health Insurance Plan (OHIP- the Ontario equivalent to MSP). The Ministry of Health and Long Term Care (the Ministry) began a review of lab services in the early 1990's with a view to reducing the degree of redundancy in the system. The non-regionalized system featured many independent public facilities, as well as private facilities competing for lab services funding.

Nine macro regions were identified and implementation of reforms is being undertaken 3 regions at a time. Each region must submit a plan to the Ministry indicating how lab service will be rationalized.

Ontario lab services structures vary between regions in terms of the mix of public/private/not-for-profit involvement. Regional plans may involve partnerships or coalitions of hospitals, private labs and not-for-profit groups. Some partnerships are decades old while others are more recently established. Regional laboratory service plans must be approved by the Ministry. The current regional planning initiative was explicitly declared not to be a cost-cutting exercise. Any savings realized will be reinvested in laboratory service provision within the respective regions.

While coordination efforts were being initiated in designated lab regions, changes were also made to the outpatient, fee-for-service side of lab services in Ontario. Both price and volume adjustments were used to manage lab expenditure and utilization. In 1996, a cap on private sector volumes was implemented, initially for a two-year period but extended for a further three years until 2001. The rate of growth of private sector expenditures has slowed and there has been an increased pressure on public facilities, particularly in rural

areas. Overall, increasing volumes continue to push expenditures beyond the cap. In 2001, the prices—or fees paid—for several high-volume tests were reduced. These included the complete blood count and the thyroid stimulating hormone test.[17]

11.2 Saskatchewan

Reforms to lab services in Saskatchewan were driven by a number of factors including a Ministry of Health budget deficit and the sense that lab services expenditures were out of line with the actual costs of delivery these services. The creation of regional health authorities, or District Health Boards, in 1993 facilitated a regionalized approach to lab services. As part of the reform approach, fee-for-service and hospital grant funding was amalgamated into a single global funding pool, and full responsibility and funding for the delivery of diagnostic laboratory services was transferred to District Health Boards. Health Boards were permitted to engage in joint venture partnerships with independent private providers for service delivery in areas of specimen collection and transportation. A Provincial Advisory Committee was established to address such issues as standards, quality, access, and public health. However, it does not have general service oversight or coordination responsibilities.

11.3 Manitoba

Manitoba's lab reform mandate was to reorganize the public lab system to better compete with private labs. A single, province-wide lab services agency – Diagnostic Services of Manitoba (DSM) - was created. The impetus for change was mainly to better integrate the lab system, achieve cost savings and, as a matter of priority, to address shortages in laboratory human resources.

The Manitoba reforms were designed by a widely representative central planning team. Under their restructuring, certain tests were eliminated and restrictions placed on others. Quality assurance and utilization guidelines were introduced and volume-based pricing for fee-for-service tests was introduced. Different lab information systems existed in each lab with no ability to connect. An investment in an integrated information system was identified as a "required key infrastructure component" (Manitoba Health 2002). An information system upgrade costing $3.5M permitted linkage between hospital facilities. Computerized physician order entry was found to assist in utilization management.

11.4 Alberta

Alberta initiated changes to its laboratory system beginning in 1994. Major changes included the creation of a single funding pool for lab services and administration by regional health authorities with provisions for joint venture partnerships involving public and private service providers. The reforms were implemented over two years, beginning with a reduction of the fee-for-service component by 40% and redirection of funds to

[17] These are both high volume tests in BC.

health authorities under a population needs-based funding model.

A variety of approaches was adopted by different Health Authorities (Whitnack 2002). Some Health Authorities (Edmonton) contracted out all high volume tests to private sector providers. Some (Calgary) adopted a "partnership" approach which engaged the public and private sectors in an administrative and delivery role, while others (Lethbridge) chose to use public sector providers to deliver all lab services.

In an effort to cut costs, Calgary significantly reduced the number of specimen collection stations, with reportedly no negative impact in terms of public opinion. Lethbridge reinvested in the public lab system that then underwent significant process re-engineering to become leaner and more efficient. This re-engineering borrowed many of the positive aspects from the private lab model. The region repatriated most of the lab work previously done by privates and the public lab now does approximately 98% of the region's lab work. The Chinook public lab has had a 50% increase in the volume relative to 1995 levels while spending less money than in 1995.

Management of Alberta's lab system was structured through the development of regional service contracts that addressed funding arrangements, service commitments, standards and data reporting requirements. It is reported that these initiatives have resulted in as much as 25-30% ($70M) reduction in costs, however reinvestments were required as the system matured.

11.5 Relevance for BC's Reforms

While it is difficult to draw direct comparisons with experiences in other jurisdictions due to different underlying policy and administrative structures, there are several important lessons to be learned from the reform exercises completed or underway in other provinces. Notably:

11.5.1 Adopt a comprehensive approach

Alberta and Saskatchewan have adopted a comprehensive approach to administration and management of labs. All laboratory services, whether inpatient or outpatient have been organized under a single administrative and funding structure through the Health Authorities, rather than maintaining two funding and administrative streams – grants and fee-for-service. This approach seems best able to promote seamless patient care: patients are not differentiated according to whether they receive their care on an inpatient or outpatient basis. Although the intent of the Manitoba reforms is to achieve province-wide coordination of lab services, outpatient lab services (at least in the short term) continue to be provided by independent private providers, funded separately, on a fee-for-service basis. As in Ontario, this fails to optimize existing capacity in the public sector and leads to cost-shifting: Health Authorities, or in the case of Ontario, hospitals, "push" patients to fee-for-service-funded outpatient facilities, rather than incurring the costs of providing these services from within their own, fixed budgets.

Adopting a province-wide comprehensive approach would allow coordination of all lab service issues, responsibilities, and reforms as an integrated whole, creating a true "system" of lab services across the province that would:

- allow better utilization management overall
- promote service delivery at the most appropriate site
- ensure the "price" for provision of service matches the service level and need
- promote integration of lab services

11.5.2 Set realistic ectives for services and savings

Reforms in Alberta and Saskatchewan had explicit expenditure reduction targets that did not first stipulate service delivery objectives. While considerable savings were achieved they were not as great at initially anticipated and reinvestments were required to meet service delivery targets. Expertise was lost to the system during the initial reform process through staffing cuts and some essential assets, as noted above, suffered in the transition. Setting realistic, manageable reform targets is critical to success. This would:

- Ensure decisions about lab services are made in the context of overall patient care needs. Agreement on service levels precedes decisions about reforming service delivery to ensure that access—turn around times and proximity to specimen collection stations—, and costs of service delivery—specimen transportation, fixed costs of existing staff and equipment—are balanced with economies achieved through specialization and consolidation.
- Ensure key responsibilities and core system assets—teaching and research, public health, and tertiary care/out-of-region care needs—are not jeopardized through service and staffing cuts.

11.5.3 Put coordinating mechanisms in place

Reforms in Manitoba and Ontario both feature central coordinating functions. In the case of Ontario, the function is housed within the Ministry of Health and Long Term Care and is focused more on setting policy objectives and facilitating processes in each of the designated "regions" of service delivery. In Manitoba, the central coordinating structure is a core feature of the centralized, provincial approach to service delivery. In the provinces where a central coordinating mechanism is not present it is difficult to get a coherent, province-wide picture of the functioning of lab services. A central coordinating mechanism would appear to offer significant value in:

- Ensuring that lab services are managed as a province-wide system with system assets protected

- Allowing thoughtful, planned consolidation of tertiary and quaternary or low volume services
- Ensuring equitable service delivery and access across the province
- Permitting province-wide performance standards to be implemented, and province-wide monitoring and management to occur
- Creating a forum and process for sharing of best practices, and
- Achieving economies through collective efforts on common issues such as information systems, human resource planning, utilization review and management, and common services.

11.5.4 Invest in change

Reforms in Manitoba paid explicit attention to the need to invest in change[18]. Integrated lab information systems were identified in virtually all reform experiences as critical to achieving success and the process of change must be resourced to encourage and support participation in process redesign (Manley 2003;Garcia 2003;Murray 2003a;Crosby 2003). Investments in a linked or comprehensive lab information system are essential to seamless patient care, effective utilization review and management, detailed costing, and delivery system improvements. Investments that add value to the system as a whole and meet common needs are difficult to achieve on an *ad hoc* basis when competing pressures takes precedence, incentives are lacking, and the significant resources required are not available. Investment in change would:

- Ensure tools and processes to support change and long term system sustainability are in place system-wide.

11.5.5 Allow flexible response

Reform experiences from other jurisdictions suggest that an appropriate balance must be found between flexibility and structured leadership. Reforms in Ontario have permitted flexible responses based on the needs and experiences of each distinct lab region. However, progress has been slow and the ultimate objective of creating regional envelopes for lab services which include private sector providers does not appear close at hand (Colgan 2003). Alberta's reforms have permitted a variety of diverse service approaches at the regional level and encouraged the private sector to play a role where it has much to contribute. But, not all regional models have been equally successful. Without parameters requiring protection of core services or acceptable models of governance, some system components have suffered. By contrast, "decisions based on analysis of data without knowledge of process" may achieve system change but may also fail to recognize "unique issues and [the nature of]

[18] The Treasury Board submission supporting lab reform in Manitoba opens with a request to government for "one-time capital and transition investment".

complex systems" (Murray 2003b). The reforms in Saskatchewan were seen by some to be unduly prescriptive and restrictive of legitimate roles for the private sector.

In the context of BC, allowing a flexible response would:

- Recognize the strengths of service delivery roles across the public and private sector
- Ensure Health Authorities can respond to the diverse needs of their publics in the most cost-effective way possible

11.5.6 Manage change with clear and unambiguous leadership

Just as flexibility is key to ensuring customized approaches to meeting needs in each of the HAs, clear direction and parameters for reform are essential to ensure that "the whole is greater than the sum of its parts". Experience from all lab reform exercises indicates that the process of change is laborious and contentious, with many competing objectives, incentives and interests. This process must be carefully and closely managed to ensure progress towards system goals is made in a timely and respectful manner. A managed approach to change would:

- Recognize the policy and leadership role of the Ministry
- Set clear pathways to reform with manageable stages and clear expectations
- Create a recognized locus for ensuring system excellence

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Wright, Brock. Medical Officer, Vice President Laboratory Services. 2-17-2003.
Ref Type: Personal Communication

13. APPENDICES

13.1 Top 20 Laboratory Medicine Fee Items Ranked by Billings

Fee Item Description	Expenditure	Paid Services
HAEMATOLOGY PROFILE	$28,720,387	1,853,073
PRIMARY BASE FEE	$28,292,946	2,045,206
THYROID STIMULATING HORMONE, TSH	$16,672,164	894,247
PROTHROMBIN TIME/INR	$10,710,444	747,615
HDL CHOLESTEROL	$8,739,103	677,303
CHOLESTEROL, TOTAL	$8,472,113	745,370
FERRITIN, SERUM	$8,105,127	261,957
TRIGLYCERIDES, SERUM/PLASMA	$7,699,643	690,463
HAEMOGLOBIN, A1C	$5,688,863	321,740
URINE COLONY COUNT CULTURE	$5,460,110	401,625
PROSTATIC SPECIFIC ANTIGEN (PSA)	$4,047,581	156,312
THROAT OR NOSE CULTURE	$3,832,452	257,689
VITAMIN B12	$3,402,678	131,740
URINALYSIS, MACROSCOPIC	$3,325,624	695,336
CHLAMYDIA TRACHOMATIS USING NAT	$2,765,580	93,815
ANTIBIOTIC SUSCEPTIBILITY TEST - SEMI QUANTITATIVE	$2,500,202	151,796
FOLLICLE STIMULATING HORMONE (FSH)	$2,335,701	76,526
IMMUNOFLUORESCENT STAINING - AUTOANTIBODIES	$2,250,036	67,856
BIOCHEMICAL IDENTIFICATION - MICRO-ORGANISM	$2,143,435	187,121
MICRO ALBUMIN	$2,089,276	84,637
Total Top 20 Fee items	$157,253,465	10,541,427
Total Other 541 Fee Items	$97,207,460	13,786,765
Total	$254,460,924	24,328,192

Source: (Medical Service Plan (MSP) 2003)

13.2 Key Informant List

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Ministry of Health Services

Alan Moyes
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Ministry of Health Planning

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BCCDC

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